The Lepidopterists' News

THE MONTHLY PERIODICAL OF THE LEPIDOPTERISTS' SOCIETY
c/o Osborn Zoological Laboratory, Yale University, New Haven 11, Connecticut, U.S.A.
Editor - C. L. REMINGTON • *Assoc. Editor* - J. E. REMINGTON

Volume IV 1950 Numbers 1-2

FORMAL ORGANIZATION FOR THE LEPIDOPTERISTS' SOCIETY

The Lepidopterists' Society was founded approximately three years ago, as this issue of the Lep. News goes to press. A set of temporary "Articles of Organization" was formulated (see Lep. News, vol.1: p.2) in which the concluding Article was: " The activities of the SOCIETY shall be handled entirely through the medium of the NEWS and its editors. No meetings are contemplated, and the organization will not require elected officers." The Society has continued on that basis until the present time, although it had quickly become clear that a full-fledged society would be a necessary basis if the News and other activities were to have good prospects for permanence. Further, as long as the planning and work of the Society are concentrated in the hands of as few as two persons, there is a distinct upper limit restraining development.

Discussion from members on the question of formal organization was requested over a year ago and many valued comments resulted.

The process of formally organizing the Lepidopterists' Society has now begun. The editor has asked Mr. Cyril F. dos Passos to prepare a form of Constitution and By-Laws for the Society, and although this task will force him reluctantly to give less time to assembling an important catalogue and check-list, he generously acceded. He is now engaged in refining the document and expects to have a draft ready this spring. It will then be studied and finished by a representative committee. Final ratification will be by vote of the entire membership of the Society. It is hoped that the Constitution will be officially adopted before the end of 1950 and that the election of 1951 officers by mail ballot to the entire membership will take place at the end of 1950.

It is appropriate at least once each year to enumerate the projects of the News and the Society.

1. The annual List of Members provides a geographical directory of names, addresses, and special interests of all members.

2. The Boards of Specialists, for authoritative identification of Lepidoptera and their food-plants and parasites, were arranged to remove the misidentifications which have been a plague in papers on local faunas, life history, biogeography, and biology in the literature on Lepidoptera for many years. (See next page for the present Boards.)

3. The annual Field Season Summary assembles a large body of fresh information on Lepidoptera conditions in North America at the end of each season -- information of great potential value as the record accumulates.

4. The regular News section "Recent Literature on Lepidoptera" is aimed toward the inclusion of every paper on Lepidoptera which is published in any part of the world after 1946. Peter F. Bellinger has made a tremendous contribution toward the completeness of this section. With great care he has examined every issue since January 1, 1947, of several hundred biological periodicals and has abstracted every paper dealing with Lepidoptera not yet covered in the Lep. News. Furthermore, he has for many months been responsible for abstracting such papers in all new issues of these periodicals. The files he has prepared for the Society will make it easy to know in a moment whether any issue of any periodical has been examined. We are seeking at least one regular abstractor in every country with biological publications, but until such coverage is arranged Mr. Bellinger is personally establishing the Recent Literature section as the most complete literature abstracting medium for Lepidoptera that has ever existed. We receive more enthusiastic letters in favor of this section than for any other aspect of the News.

5. The Lep. News has several other recurring features, such as Prof. Forbes' Question and Answer column. As in the past, no new taxonomic material (new species, new descriptions, etc.) will be accepted for the News. It is felt that these should go to the multitude of research periodicals. Usually only solicited articles are desired; it is intended that these be chiefly of a review nature. However, field notes and technique suggestions are welcomed from members IN ALL PARTS OF THE WORLD.

6. An important Society project, "The Nearctic Butterflies", has as its Coordinating Editor F.M. Brown. It is planned as an exhaustive treatment in several volumes of the systematics and biology of North American Rhopalocera. About 70 Society members are now providing data to be used in the volumes.

Subscribers to the Lep. News (including all members) are guaranteed the delivery of every issue. Please check your file of the News to be sure you received the nine issues of Vol. 3. We will forward, at no cost, all numbers not received ONLY IF YOU REQUEST THEM BEFORE 1 JULY 1950.

HOST PLANT IDENTIFICATION

An aspect of Lepidoptera biology of prime importance for knowledge of taxonomy, phylogeny, ecology, and genetics, as well as for economic studies, is the exact identification of host plants on which the larvae feed. Accurate identifications are the only useful ones. Consequently arrangements have been made to provide host plant identifications for all North American workers. Probably members in other parts of the world will find botanists of their nations equally cooperative. North American plants will be identified as follows:

GRASSES ..... John R. Reeder
Osborn Botanical Lab.
Yale University
New Haven 11, Conn.

OTHER PLANTS .....Ivan M. Johnston
Arnold Arboretum
Jamaica Plain 30, Mass.

Dr. Reeder is a leading authority on grasses. Professor Johnston is not only an outstanding plant taxonomist, but also an enthusiastic lepidopterist. Please write them before sending material and please mention your Lepidopterists' Society membership.

In order to insure ready identification it is essential in collecting the plants to take the following steps:

1.) Preserve the specimen carefully. Flatten and dry it simultaneously either in a standard botanical press or between sheets of newspaper placed in a large book weighted by any heavy weight. Press it for at least one week. The plant may be mailed in folded newspaper, with the package braced against bending by strong cardboard backing on both sides.

2.) Preserve as many parts as possible. Leaves attached to a stalk or twig and the flower are essential for most plant species. The fruit is always helpful, and in grasses the seeding stalk is necessary. If it is small enough, press the whole plant.

3.) Include complete data: locality, date of collection, habitat, and altitude if in mountains.

IDENTIFICATION OF PARASITES

We will be glad to publish in the Lep. News records of all accurately identified parasites whose host is known. Be sure to save carefully all parasites you rear. The following authorities have kindly agreed to identify parasites. We do not yet have a determiner for the minute Chalcid wasps, but these should be saved. (See Lep. News, vol.2: p.53 for descriptions and illustrations.)

ICHNEUMON WASPS (Ichneumonidae) ..... H.K. Townes
North Carolina State College
Raleigh, N.C.

BRACONID WASPS (Braconidae) .... C.F.W. Muesebeck
Div. of Insect Identification
Bureau of Entomology & Pl. Quar.
Washington 25, D.C.

PARASITIC FLIES (Larvaevoridae) ... C.W. Sabrosky
(same address as Mr. Muesebeck)

BOARD OF SPECIALISTS

The purpose of the Board is to strive toward a high standard of accuracy in published check-lists, life histories, etc. by providing authoritative identifications of specimens forming the basis of these published papers. The following rules concerning the service were formulated by the Board:

1. No specimens may be sent until the specialist has replied in writing that he is ready to receive them.
2. No specimens will be accepted unless full data (not key numbers) are on each specimen.
3. A series of each species must be spread, mounted on pins; others may be in papers.
4. Wherever possible, at least 3 prs. should be sent.
5. The specialist may, if he chooses, retain a fair sample of each species needed, but not uniques.
6. Return postage should be provided.
7. Specimens must be carefully packed.

NORTH AMERICA:

Pieridae & Boloria ("Brenthis") ..... A.B. Klots
American Museum of Natural History
New York 24, N.Y.

Satyridae ..... C.F. dos Passos
Washington Corners, Mendham, N.J.

Speyeria ("Argynnis") ..... L.P. Grey
Lincoln, Maine

Theclinae (Hairstreaks & allies) .... H.K. Clench
1270 Sudbury, Willow Run Village, Mich.

Plebejinae (Blues) .....V. Nabokov
Cornell University, Ithaca, N.Y.

Hesperiidae (Skippers) .....A.W. Lindsey
Denison University, Granville, Ohio

Noctuidae & Notodontidae ..... J.G. Franclemont
5829 Little Falls Rd., Arlington, Va.

Catocalinae & Aegeriidae ..... A.E. Brower
5 Hospital St., Augusta, Maine

Tineoid families ..... Annette F. Braun
R.R.13, Box 41C, Cincinnati 30, Ohio

Pyraustinae ..... Eugene Munroe
Division of Entomology
Dept. of Agriculture
Ottawa, Ontario, CANADA

CENTRAL & SOUTH AMERICA:

Hesperiidae ..... E.L. Bell
150-17 Roosevelt Ave., Flushing, L.I., N.Y.

WEST INDIES:

Hesperiidae .....E.L. Bell

All other Rhopalocera ..... Eugene Munroe

AFRICA:

Lycaenidae ..... H. Stempffer
Lab. d'Entomologie du Muséum
45 bis, rue de Buffon, Paris (5e), FRANCE

LEAF-MINING LEPIDOPTERA WITH SPECIAL REFERENCE TO METHODS OF REARING

by Annette F. Braun
Cincinnati, Ohio

The leaf-mining habit has developed in many families of that group of Microlepidoptera often referred to as Tineina. Certain Eriocraniids (Jugatae) are also leaf-miners. The Cosmopterygidae, Scythridae, Heliozelidae, Elachistidae, Coleophoridae, Gracilariidae, Lyonetiidae, Tischeriidae, and Nepticulidae are the principal leaf-mining families; many if not all of their members are miners for at least part of their larval life. Leaf-miners are also found in the Gelechiidae, Heliodinidae, Yponomeutidae, and others. The leaf-miners are the smallest of the Lepidoptera; some do not exceed 3 mm. in wing expanse.

In response to the unique environmental conditions, i.e., life inside of a leaf, modifications in larval structure have developed. (See Needham, Frost, and Tothill, 1928, for a detailed discussion.) The extreme specialization is found in the Gracilariidae where, in the early instars -- the sap-feeding instars -- there is such flattening and modification of the mouth-parts that the larva is able only to cut through a single layer of cells of the leaf tissue and suck the sap.

The entire larval life may be passed inside of a single mine. Some leaf-miners may make more than one mine. The early larval instars only may be passed in a mine; in the later instars, the larva may feed exposed on the leaf, or within the protection of a characteristically folded or rolled leaf, or may construct a portable case, from which it mines into the leaf tissue. It is not possible here to enumerate all of the variations of mining habits.

With some experience it becomes possible to recognize the genus and often the species from characteristics of the mine. Such characteristics include the form of the mine, whether the loosened epidermis is smooth or wrinkled, the amount of leaf tissue consumed, and the means of disposal of the waste products -- "frass" -- whether retained within the mine or ejected from it.

Where the entire feeding life is spent within the mine, pupation may take place within the mine, either with or without a cocoon; or the larva, when full-fed, may leave the mine and spin a cocoon in a fold of a leaf, in any convenient crevice, or amongst the humus on the ground. Pupation may take place at once or a long dormant period may intervene (in some instances nearly a year) with pupation shortly before the emergence of the imago.

Mining and pupating habits of the species must be taken into consideration if success in rearing the moths is to be attained. Rearing is the only satisfactory method of obtaining a good representation of the leaf-mining Lepidoptera. Many species are rarely seen unless reared.

When the entire larval life is passed in one mine, the leaf must be kept in fresh condition. Such mines should be collected near the end of larval life, and may be placed in jelly glasses with close-fitting lids (or smaller containers if few mines of a species are found). It is well to preserve specimens of various stages in the development of the mine for future reference. The leaves should not fill more than three-fourths of the container, with not more than one species in a container. A paper bearing a number corresponding to that in the records should be placed in the container; this same number should become a part of the label on the pin of the reared moth. If excessive moisture accumulates, a strand or two of sphagnum will absorb it, and does not encourage the growth of mold. Larvae which leave the mine to pupate often wander considerably, and will drown in a film of moisture on the sides of the container. For those which normally spin in a fold of a leaf or in a crevice, a few fragments of crumpled tissue paper may be provided; for those which spin on the ground a little loose earth, preferably mixed with broken pieces of unincorporated humus should be provided. Use scarcely enough to cover the bottom of the container.

Where the species are miners for only a part -- the earlier instars -- of larval life, the minute larvae must have fresh food available when they leave the mine. This often calls for careful transference to the fresh food. Collection of these early mines and notes on their appearance are necessary for the keeping of accurate data, but for practical rearing purposes it is more advantageous to make notes on the mines and return in a few days or a week to the exact place and collect the larvae in their later stages, when fresh food can be provided without handling and possible injury to the larvae.

Where pupation has taken place at once, the emergence of a considerable proportion of the imagoes may be expected. When pupation is delayed, difficulties arise. The interval between cessation of feeding and pupation may be as great as six or seven months or even more. The problem is to provide sufficient moisture to prevent the dormant larvae from drying up; in the summer generation, the addition of a few drops of water at intervals will suffice, as the period between cessation of feeding and emergence of the imago is approximately two weeks.

Overwintering dormant larvae must be hibernated out-of-doors. I use a box, made of square-mesh galvanized wire, its bottom lined with screen wire to prevent the entrance of earthworms. This is placed on the ground where no sun will strike, and elevated slightly above the ground with a few pebbles. The lids of the jelly glasses are removed and strong unbleached muslin tied securely around their tops; the glasses are then placed INVERTED in the hibernating box. Sufficient moisture will rise inside the glass. The glasses may be brought in when time for emergence approaches and the same procedure followed as in the summer generation. In a few groups, larvae feed again in the spring after a long dormant period. The rearing of these is a special problem.

Most Microlepidoptera emerge in the mid-afternoon or early evening. Several hours at least

should elapse before they are killed. If the rearing jar is opened close to a window pane, many species will fly to the glass and are easily caught by placing over them a small killing vial.

Features of each family will be considered, following the check list sequence (McDunnough, 1939).

COSMOPTERYGIDAE

These are leaf-miners, gall-makers, or external feeders. The mines of Cosmopteryx are blotches of various shapes, and may be found on grasses, sedges, and the leaves of dicotyledonous plants. Their outstanding characteristic is the cleanliness of the mine; most of the leaf tissue is eaten. Pupation is usually outside the mine. The moths are sometimes seen whirling on leaves near the food plant. The mines of Psacaphora are similar to Cosmopteryx in general shape, but in these the frass is retained within the mine and irregularly disposed. Members of the Onagraceae are the favorite food plants. The mines of Chrysopeleia, one species on Quercus (Oak), the other on Ostrya (Ironwood), usually start in the angle between two veins, the margins diverging; the frass disposed in two blackish diverging lines.

EPERMENIIDAE

Most of the species mine leaves of Umbelliferae, making several mines. The cocoon is a coarse open meshwork.

GELECHIIDAE

While comparatively few of the species of this great family are leaf-miners, there is great diversity of habit and character of mine. The mine of Chrysopora lingulacella Clem. is a gradually widening contorted band, with scattered frass. Several species of Aristotelia make blotch mines. The species of Recurvaria may mine needles of conifers, passing from one needle to another, or make blotches, similar to those of Aristotelia, in leaves of dicots; other species are skeletonizers feeding under the protection of a web of silk. The needle-miners begin their development in one year, completing it the next spring; therefore in rearing, mines had best be collected in the spring. In the genus Gnorimoschema are a number of leaf-miners whose work may be recognized by the peculiar mode of disposal of the frass. Their mines begin adjacent to or over the midrib, from thence spreading out over the leaf; at the beginning of the mine, the epidermis is wrinkled and to this gallery the larva retreats to eject the frass at the entrance of mine where it adheres together forming a black curled projection. Several of these species mine leaves of Compositae; a species with similar habits (G. scutellariaeella Cham.) mines leaves of Scutellaria (Skullcap). Other species of Gnorimoschema are gall-makers, of which the very common G. gallaesolidaginis Riley is an example. Most Gelechiidae are easily reared, as they pupate at once after spinning the cocoon.

HELIODINIDAE

One or two instances of unusual larval habits are worthy of mention. The larva of Cycloplasis panicifoliella Clem., a miner in leaves of panic grass, when full grown, cuts from the upper epidermis of the mine a perfect circle which is folded in half and serves as a pupal chamber. The larvae of Erineda spin a web on the underside of the spore-bearing fronds of ferns, and mine into the sori, eating out the spores. At maturity the larva turns bright red, and spins a double fine white silk cocoon, within which it pupates at once. The moths emerge the following summer at the time the spore-bearing fronds are produced. In drought years, when no spore-bearing fronds develop, the moths do not emerge, but remain in the pupal state until the second summer.

YPONOMEUTIDAE

Larvae of some species of Argyresthia mine in needles of conifers, passing from one needle to another; a few mine in bark or in fruits. They reach maturity in the spring and the mines should be collected before the larvae have deserted them to spin a rather open meshwork or a dense cocoon. These cocoons may sometimes be found on the twigs adjacent to the mine. The imagoes emerge in a week or two.

SCYTHRIDAE

This family is represented in this country by the genus Scythris. Most of the species whose life history is known are leaf-miners. The mines may be recognized by the sheet of silk which is spun from the base of the leaf and beneath which the larva enters the leaf.

HELIOZELIDAE

The mines may be recognized by the oval hole left when the larva cuts out a piece of the mine for a pupal chamber. The upper and lower epidermis are spun together at the margins of the oval which is either attached to some object by two or three silk projections from one end or drops to the ground. The mines themselves are irregular translucent blotches, with the frass crowded toward the beginning of the mine. In some species, the overwintering generation passes the winter in the larval state and should be hibernated out-of-doors.

ELACHISTIDAE

The majority are grass and sedge miners. Mining is usually begun late in one season; the larva is dormant during the winter and resumes feeding early the following spring, often entering a new leaf. Such mines should be collected early in the spring and near the time of maturity, as grass leaves dry up easily, and if kept moist, mold. Pupation takes place outside of the mine, the pupa either in a slight cocoon or attached to a stem by anal end and median girdle, as in the papilios.

COLEOPHORIDAE

This family is represented in North America by perhaps 200 species of the genus Coleophora, many of them undescribed. The genus takes its name -- Coleophora, a case-bearer -- from the habit of the larva of constructing a portable case from pieces of its food plant, or spinning one of silk which may be decorated with particles of the food materi-

als. Many plant families are represented among the food plants. The peculiarities in larval habits make the species of this genus some of the most difficult of all Microlepidoptera to rear. The larvae are miners in leaves or in seeds in the first instar. The mine in a leaf is a very small blotch or a linear track, and the larva lives within this mine as other leaf-miners do. From the end of this mine, the larva cuts its first case, which is attached to a leaf at an angle, usually on the underside; from its mouth the larva mines into the leaf, eating only that tissue which can be reached by extending the thorax and possibly a few abdominal segments out of the case. Many such small mines may be made, always recognizable by the circular hole near their center through which the larva entered the mine. A larger case is cut from a mine, with the small case often remaining attached to its apex. There is great variation in form of cases, but the case of each species is characteristic of the species. Pupation takes place within the case and the imago emerges from its apex.

As a general rule, the larva feeds during the summer, first as miner in a leaf, later as a case-bearer, but passes the winter as a partially grown larva, feeding again in the spring as soon as the leaves of the food plant unfold, and constructing its final case. Growth is completed soon, and the imagoes emerge within a few weeks. This habit makes rearing difficult as it involves carrying the partly grown larva through the winter and then supplying food at the critical time. The undertaking is seldom successful. It is necessary to observe the larvae during the first season, taking notes and keeping examples of the work and cases, then to revisit the locality in the spring and collect the cases.

Those species which at first mine inside of developing seeds construct cases of silk and portions of the floral parts, which are then attached to the seed or seed pod, into which the larva mines. Growth is completed with the ripening of the seeds, but the imagoes do not emerge until the time of flowering of the food plant. The larva remains dormant in the case until a couple of weeks before emergence and therefore the cases should be kept in the hibernating box up to that time. By following this procedure, a fair percentage of moths of the seed-feeding species may be obtained.

GRACILARIIDAE

This is the great family of leaf-miners, and the one with the greatest specialization for this mode of life. All of its members (with one or two exceptions) are miners for at least the first two instars; they never feed exposed. In the genus Gracilaria, a very small mine is made, with leaf tissue eaten just before the larva leaves the mine. Typically, the larva, on leaving the mine, constructs a cone by rolling down the leaf from its tip or from the tip of a lobe; usually three such cones are made, progressively larger (for example, G. packardella Cham. on sugar maple). A close elongate cocoon is spun. Ornix (Callisto, Parornix) mines in the earlier instars, later feeds under the folded margin of a leaf. The mines of Parectopa and Acrocercops are irregular blotches, sometimes digitate. At first, merely the epidermis is separated (during the sap-feeding instars); later, leaf tissue is consumed in a more or less irregular fashion. Species of these two genera pupate on leaving the mine. The mines of Phyllocnistis and Marmara are long narrow winding tracks; the larvae are sap-feeders. In Marmara the cocoon is spun outside the mine; it may be recognized by the glistening globules on its surface. The species of Phyllocnistis pupate in a slight enlargement at the end of the mine.

The species of Lithocolletis are miners throughout larval life and pupate inside the mine. Two divisions of the genus are recognized: one in which the larva changes to the cylindrical form after the first few instars and becomes a tissue-feeder; the other in which the sap-feeding structure and form is retained throughout all the feeding instars. Mines of the first division, during the sap-feeding instars, are blotches with the thin epidermis of the leaf (usually the lower epidermis) separated from the rest of the leaf tissue. No further increase in area takes place in the tissue-feeding instars; the larva consumes the parenchyma within the mine, which is made "tentiform" by wrinkling of the loosened epidermis. The mines are easily recognized in the later stages, and the leaves will keep long enough for the larvae to complete their growth. Of most species there are two generations a year. The miners of the second division continually increase the extent of the mine, as they are able only to suck the sap as they cut through the cells. It is always the upper epidermis which is separated from the rest of the leaf tissue. Such mines are usually greater in area than those of the first division. No silk is spun during the feeding period; the spinneret develops in the instars just preceding the pupal stage. At this time, in the EARLY SUMMER generation, several strong folds are made in the loosened epidermis; beneath these folds the broadly oval flat cocoon is spun and pupation takes place at once. However, in the OVER-WINTERING generation, no such folds in the epidermis are made; instead, the larva constructs a circular hibernating chamber, just large enough to contain itself. This hibernating chamber is flat on the upper side, convex on the underside of the leaf. Such mines must be placed out-of-doors for the winter before the leaves dry too much.

LYONETIIDAE

The intricate and beautiful cocoons will identify several of the genera. The ribbed cocoons of Bucculatrix; the cocoons of Leucoptera, Proleucoptera and Paraleucoptera consisting of two broad, parallel, white bands connected across the middle, beneath which the cocoon proper is spun; the pupae of Lyonetia suspended in irregularly diverging strands of silk -- all these are characteristic. The species of most of the genera form blotch mines in leaves, sometimes making more than one mine; among these is the cosmopolitan Bedellia somnulentella Zell. on Morning Glory (Ipomoea).

The largest genus is Bucculatrix. With the exception of a few gall-makers, the larvae are leaf-miners at least during the earliest instars, later

feeding exposed. The mines are inconspicuous and the larvae are minute when they begin to feed externally. A jarring of the leaf causes them to drop down on a silk thread. The leaf is eaten in small patches, either upper or lower epidermis remaining intact. Later, the leaves may be skeletonized. The tiny moulting cocoons are unique. Many feed on herbaceous plants. Collecting toward the end of larval life is preferable.

TISCHERIIDAE

The larvae of most are miners in leaves of oaks, Rosaceae and Compositae. The mines are blotches on the upper side of the leaf, gradually expanding, the upper epidermis much wrinkled. Part of the mine is partitioned off and silk-lined as a pupal chamber; in most species pupation takes place at once in both summer and overwintering generations.

NEPTICULIDAE

These are the smallest of the Lepidoptera, some species expanding scarcely 3 mm. The larvae of all, with the exception of a few gall-makers or bark-miners, mine in leaves, chiefly of trees and shrubs. In many species, the long contorted linear mine very gradually increases in breadth; in others, it more or less abruptly enlarges into a blotch. When full-fed, the larva drops to the ground and spins a dense, flat, oval cocoon with projecting margins. It remains in the larval state until a few days before emergence in both summer and overwintering generations. There are at least two generations of most species; mining larvae of the first may be found in early summer, of the second six or eight weeks later. A number of these small mines, in pieces of leaf just large enough to allow for increase in the length of the mine, may be placed in one container. Shell vials, 3/4 to 1 inch in diameter and several inches long, are very useful rearing jars for Nepticulidae. The moths on emergence are active almost at once.

ERIOCRANIIDAE

This family and the Micropterygidae may be called the Microjugatae in contrast to the Hepialidae, or Macrojugatae. The larvae of Microptergyidae feed on mosses and liverworts, those of the Eriocraniidae are leaf-miners. The only American Eriocraniid whose life history is known (Mnemonica auricyanea) is a miner (of local distribution) in leaves of oaks (Quercus) and chestnut (Castanea), making in early spring a linear mine enlarging into an inflated blotch. When full-grown, the larva burrows into the ground, spinning a tough cocoon in which it passes the summer, fall and early winter, transforming to a pupa in late winter. The pupa is remarkable in the possession of functional mandibles, by means of which it cuts its way out of the cocoon and digs up through the earth.

The few references given below are only suggestive, as much of the literature of Microlepidoptera consists of scattered papers.

REFERENCES

(1) Braun, Annette F. 1908. "Revision of Lithocolletis." Trans. Am. Ent. Soc., vol.34: pp.269-371.

(2) ---------- 1917. "Nepticulidae of North America." Trans. Am. Ent. Soc., vol.34: pp.155-209.

(3) ---------- 1948. "Elachistidae of North America." Memoirs Am. Ent. Soc., No.13.

(4) Busck, August. 1902-1939. Numerous papers on Microlepidoptera in Proc. U. S. Nat. Mus., Proc. Ent. Soc. Wash., and other periodicals.

(5) Chambers, V.T. 1871-1878. Papers in Can. Ent., vols.3-11; Cincinnati Quart. Journ. Sci.; and others.

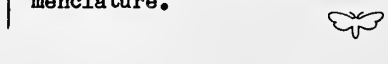
(6) Clemens, Brackenridge. 1872. "Tineina of North America." Edited by H.T. Stainton.

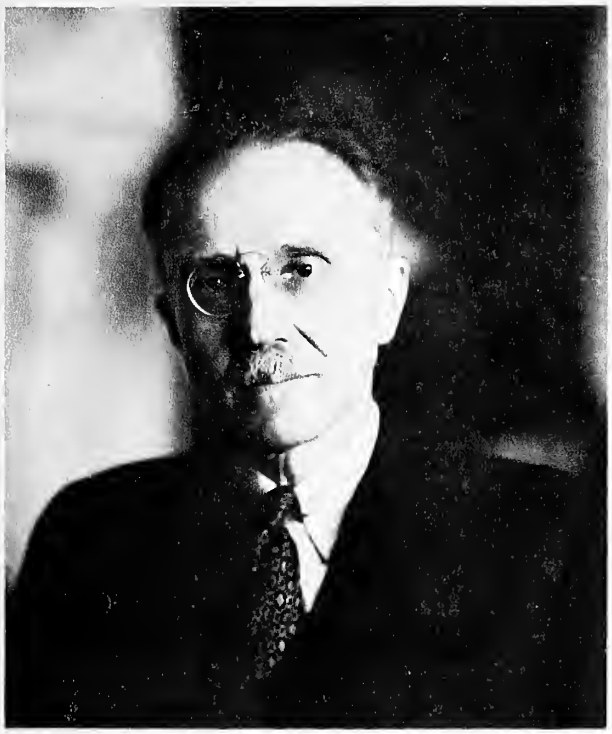
(7) Forbes, Wm. T.M. 1923. "Lepidoptera of New York and Neighboring States." Part I. Mem.68, Cornell Univ. Agric. Exper. Sta.

(8) McDunnough, J. 1939. "Check List of the Lepidoptera of Canada and the United States of America." Part II. Microlepidoptera. (Also papers on Coleophora in Can. Ent., vols.65-78; 1933-1946).

(9) Needham, J.G., S.W. Frost, Beatrice H. Tothill. 1928. "Leaf-Mining Insects." Williams & Wilkins Co.

The SOCIETY OF SYSTEMATIC ZOOLOGY, announced to Lep. News readers in vol.2: p.2 (1948), has recently accelerated its activity very considerably. Dr. R.E. Blackwelder, the newly elected Secretary-Treasurer, has just issued News Letter No.2, with a historical sketch of the Society's formation and past business, a summary of current projects, reports, and a directory of members and their specialties. In the two years since its founding, this society has grown to 531 members. A "regular journal for non-descriptive papers" on principles of systematic zoology is under consideration. Unfortunately, the 1949 annual meeting in New York was a breakfast affair held at an inconvenient time and attended by only 42 members. However, the 1950 meeting, to be held with the A.A.A.S. in Cleveland, Ohio, in December, will probably include a symposium on "The Role of Taxonomy in Modern Zoology", and Dr. Blackwelder hopes to arrange a suitable time. All lepidopterists seriously interested in taxonomy should find affiliation with this society worthwhile. Dues are only $1.00 per year; the Lep. News office has membership forms available. Although the S.S.Z. is thus far largely a U.S.A. organization, taxonomists in other countries are welcomed. Among other things, this society if internationalized may well bring about the means of development and best function of the ill-defined and regrettably controversial International Commission on Zoological Nomenclature.





ANDREY AVINOFF (1884-1949)

It is hard to include in a short space all the many-sided accomplishments of the life of Dr. Andrey Avinoff, lepidopterist, museum administrator, and artist. He died on July 16, 1949, in New York. He was born on February 14, 1884, in Tulchin, Poland (then, Russia). His father was Lieutenant-General Nicholas Avinoff. His grandfather Admiral Alexander Avinoff had, as a young ensign, fought with Nelson on his flagship "Victory" at Trafalgar, and received the Order of the Bath. His mother, Alexandra Lukianovitch Avinoff, was the granddaughter of V.I. Panaieff, who had been an amateur lepidopterist. His older brother, Nicholas, was Minister of the Interior in the Provisional Government following the abdication of Nicholas II. His sister is Elizabeth Shoumatoff, the portrait painter. Dr. Avinoff was not married.

His mother's ancestral home was near Poltava in the Ukraine. It was there, at the age of eight, that he began to collect butterflies. Inspired by a gift of Berg's Butterflies of Europe, he and his tutor captured twenty different species on the first day of collecting. The following year General Avinoff was transferred to Tashkent to command a brigade of sharpshooters. This gave young Andrey the opportunity to collect butterflies in the Tian Shan Mts., which was the origin of his enthusiastic interest in the Lepidoptera of Central Asia. His interest in art had an earlier beginning. He never forgot the thrill of producing a drawing of some mountains, when he was four years old, in which he first discovered the phenomenon of perspective. A few years later he was making accurate paintings of butterflies, thus combining the two interests which were the dominant factors of his life. This combination was in the tradition of the great entomologists of the past who beautifully illustrated their own works. General Avinoff, who was himself an ardent numismatist, encouraged the two hobbies of his son, not dreaming that they might ever be more than that.

Andrey Avinoff's formal training was in law and government service. He graduated from the University of Moscow in 1905 with the degree of Master of Laws with highest honors. The years immediately following brought a rapid succession of official posts. He served as Assistant Secretary General of the Senate, Gentleman-in-Waiting to the Emperor, member of the staff of the Direction of Ceremonies (the "Protocol") at the court, Honorary District Judge and Marshal of Nobility in the province of Poltava. These duties gave him experience in legal, administrative, and diplomatic affairs which undoubtedly was of great value in his later life as the head of an institution.

During this period, Avinoff's paintings were exhibited by the Moscow Society of Artists, of which he became a member in 1903. He took advantage of the long summer vacations from his official duties to collect butterflies in Pamir in 1908 and again in 1912 in western Tibet. He also sent forty-two other collecting expeditions to arctic and temperate Asia. The combined result of these activities was his great collection of 80,000 Palearctic butterflies. This collection broadly covered the Rhopalocera of the entire Palearctic region, but it was especially complete in Parnassius and Colias, containing some twenty types and paratypes in these two genera not represented elsewhere, including his famous P. autocrator. In 1917 Avinoff was awarded the gold medal of the Imperial Geographical Society of Russia for his zoogeographical researches. After the Bolshevik revolution of October, 1917, the collection was confiscated. It is now a part of the collection of the Museum of the Academy of Science in Leningrad.

During the World War of 1914, Dr. Avinoff did not join the armed forces, due to bad eyesight, but he served with the Red Cross and was close to the front lines caring for the wounded soldiers. In Lodz, Poland, he and a railroad-station-full of casualties were completely surrounded by the German troops, but they managed to get through on a hospital train. Dr. Avinoff also made two visits to the United States, in 1915 and in 1917, as a purchasing representative for the All-Russian Zemsky Union, a national council of the local self-governing bodies. The second mission was cut short by the Bolshevik coup d'état, and Dr. Avinoff found himself in a foreign land, where he remained, eventually to become an American citizen in 1928. His last official assignment for his former country's former government was at the Versaille Peace Conference where he was a member of the Russian Advisory Delegation under Prince Lvoff.

This break with his native land also marked the end of his legal career, and a concentration on the

pursuits which had formerly ranked only as hobbies. At first he supported himself entirely by his art, through sales at exhibitions and commissions for portraits, illustrations and advertisements. He established a reputation for his command of draftmanship and his versatility of styles and techniques. Soon, however, he responded to the call of science, which then became his principal field of endeavor.

Dr. Avinoff joined the Carnegie Museum in 1924 as Associate Curator of Entomology. He served as Director from 1926 until 1945, when he retired as Director Emeritus. He contributed greatly to the improvement of the Museum's biological collections, to the development of natural habitat groups and other modern methods of display, and to the expansion of the Museum's educational activities. He was also Advisory Professor of Zoology at the University of Pittsburgh since 1928, Chairman of the Committee on Museums of Science under the League of Nations in 1932 and 1934, Trustee of the American Museum of Natural History since 1942, and Vice President of the American Association of Museums since 1945. He was elected a Fellow of the Entomological Society of America in 1939 and First Vice President for the year 1945. He was a member of entomological societies of eleven countries, also of other scientific societies, including the Academy of Science of Madrid since 1933. Other honorary memberships included Sigma Xi, Omicron Delta Kappa, Phi Sigma, and Scabbard and Blade. He was a delegate at the International Congresses of Entomology at Ithaca, Paris, Madrid, and Berlin, and a member of the advisory committee of Eighth American Scientific Congress in Washington, 1940. He was a Charter and Sustaining Member of the Lepidopterists' Society. He held honorary degrees of Doctor of Science from the University of Pittsburgh and Doctor of Humane Letters from Washington and Jefferson College.

Dr. Avinoff's personal interest in Palearctic butterflies continued in the New World, and he gradually assembled a new collection of these, smaller but in some respects better than the first one. He also studied and published several papers on New World butterflies, two of them in collaboration with Dr. W.J. Holland. His major new interest, however, was in the Lepidoptera of Jamaica. From 1925 to 1940, he made six personal collecting trips to this island and gathered a collection of 14,000 specimens and about 1,100 species -- over double the number previously recorded. His studies of this material were only partially published before his death, and will be continued by others. The accompanying photograph was taken by the writer in Jamaica just after Dr. Avinoff collected his first specimen of the fabulous Papilio homerus.

During his travels in England and Germany, Dr. Avinoff photographed many type specimens of Lepidoptera in colors, and he advocated systematic exchange of such photographs by museums. He experimented extensively with the laws of butterfly wing patterns as affected by evolution, and developed a highly original theory of this subject involving sections of three-dimensional models. However, his primary interest always remained in the Palearctic group. He wrote: "The question to which I have especially devoted my attention in studying Rhopalocera is their distribution in Central Asia where

several distinct faunistic regions come in close contact and present a complicated inter-penetration ... the western and northwestern boundary of the Tibetan fauna which wedges into the typical Turkestan faunistic region, forming an irregular indented line which had to be carefully investigated." At the time of his death he had nearly completed his major work, a study of the subgenus Karanasa, which is being finished by Dr. Walter Sweadner. He had also made a special arrangement with the Third Danish Central Asiatic Expedition to have butterflies collected for him, and received a valuable shipment, including several novelties, from Afghanistan early in 1949.

Simultaneously with his scientific work, Dr. Avinoff continued to develop his ever-growing interest in art. He was Assistant Professor, Fine Arts, at the University of Pittsburgh since 1928, and gave a series of annual lecture courses, mainly on Oriental and Russian art, and Nature in art. He made a special study of the Russian Icons and assembled a personal library on this subject which is the finest outside of Russia. He had a virtually encyclopedic knowledge of arts and handicrafts, both ancient and modern. He was president of the Pittsburgh Chapter of the Archaeological Society of America and for years a member of the jury of the annual exhibition of scholastic art at the Carnegie Institute. His own drawings and paintings were frequently reproduced in local publications. His major artistic works published in book form are The Fall of Atlantis, consisting of nineteen fanciful wash drawings, The Nationality Classrooms of the University of Pittsburgh, and Wild Flowers of Western Pennsylvania and the Upper Ohio Basin, with 200 full size color plates by Dr. Avinoff and text by Dr. O.E. Jennings. Since his retirement, Dr. Avinoff devoted himself more intensively to painting and produced a body of work which overshadows all that he had done before. In this period he produced a series of precise watercolors of one hundred and forty different hybrids of Catt-

AVINOFF BIOGRAPHY - cont.

leya orchids, also literally hundreds of other paintings, for the most part involving flowers and butterflies, covering the full range of styles from the detailed exuberance of seventh century Dutch, through the various romantic and modern idioms, to a series of flamboyant fantasies and abstractions in a style entirely his own. Many of these paintings were exhibited in one-man shows at Knoedler Galleries, Carnegie Institute, Cranbrook Institute, and elsewhere. Dr. Avinoff was a member of Associated Artists of Pittsburgh, New York Watercolor Society, Grolier Club, and Century Association. In 1948 the American Museum of Natural History appointed him Research Associate in the Department of Forestry and General Botany, in recognition of his studies of flowers.

Prior to his death Dr. Avinoff gave to the Carnegie Museum his two collections of butterflies, the originals of the wildflower paintings, and that considerable part of his entomological library, including 4,000 separates, of which the Museum did not already have copies. These books were a second attempt by Dr. Avinoff. His first entomological library of over 7,000 items was destroyed by the Bolsheviks, except for a single volume of unpublished watercolors of Lepidoptera by John Abbot, which is now at the Carnegie Museum. The Museum is preparing for publication a bibliography of Dr. Avinoff's own scientific and popular writings.

No account of Dr. Avinoff's life would be complete without reference to his extraordinary skills. His near-sightedness was actually an advantage for his particular interests, as he could immediately distinguish the most minute details of a butterfly's pattern or anatomy, while on the other hand he could obtain at one glance a suffused impression of a landscape in its proper proportions of design and color. The skills of his hands were especially noteworthy. He had no difficulty in recording pictorially, in any medium, exactly what he wanted, from the finest details of a miniature to the most uninhibited modernism. Few of the most skillful butterflies could elude the sure yet delicate swing of his net, while in the laboratory he could glue together with unerring accuracy the broken ends of a butterfly's antenna. He was an outstanding amateur classical pianist, specializing in improvisations and paraphrases. Fluent in four languages, he entertained many audiences with his gift for extempore speaking.

A fine tribute to Dr. Avinoff was written in Pitt magazine, Autumn, 1949: "His knowledge had the breadth of the Renaissance gentleman and the accuracy of today. His skills were beyond those of most. And his kindness is unforgettable. As one of Dr. Avinoff's colleagues at the University said recently, 'Every time you met Dr. Avinoff on the street and talked with him you went away with something fresh and new to think about and a deep sense that you had talked with a man of ideas and of great humanity.' "

Nicholas Shoumatoff
Bedford, New York

PERSONALIA

The new editor (Rédacteur en chef) of the Revue française de Lépidoptèrologie is M. LOUIS LeCHARLES. M. LeCharles was a member of the Comité de Lecture under the former rédacteur, the late M. Léon Lhomme (see Lep. News 3: p.38; 1949). M. LeCharles is a well-known specialist on French butterflies, Zygaenidae, and Pyralidae. He is a member of the Lepidopterists' Society. Subscriptions to the Revue (900 francs) and the Catalogue des Lépidoptères de France et de Belgique (Macrolépidoptères - 1500 fr.; Microlépidoptères - fascicules 1-5 - 4500 fr.) should now be addressed to him at:
22, Av. de Gobelins, Paris V^{e}, France.

After a summer of intensive collecting for the Northern Insect Survey at Dawson, Yukon Territory, P.F. BRUGGEMANN has been working this winter at Ottawa on the Survey's butterflies. During the coming summer he will be located by the Survey at Repulse Bay on the northwestern corner of Hudson Bay, in "the land of the little sticks."

E.C. JOHNSTON, of Seattle, Washington, has left for collecting in the Southwest and expects to continue until September.

Prof. G.D. HALE CARPENTER has retired as Hope Professor of entomology, emeritus, at Cambridge University, Cambridge, England. He is continuing actively his research on African mimetic butterflies. The new Hope Professor, Dr. Varley, is not a lepidopterist.

Dr. GEORGE RICHARDS MINOT, of Brookline, Mass., U.S.A., a member of the Lepidopterists' Society, died on 25 February 1950 at the age of 64 years. Dr. Minot had been an enthusiastic amateur lepidopterist as a young man and expected to renew active work following his retirement from the faculty of the Harvard Medical School in Boston. He was a graduate of Harvard College and received his M.D. at the Medical School in 1912. A world-famous man of medicine, Dr. Minot was the director of the Thorndike Memorial Laboratory, Boston City Hospital, for 20 years. He was a specialist in blood physiology and pathology. In 1934 he was co-recipient of the Nobel Prize in medicine. He received honorary degrees from the Universities of Toronto and Edinburgh and the Royal College of Physicians, London, and high honors from several societies, cities, and institutions.

RESEARCH REQUEST

Ova from melanic females of Geometridae from any part of North America are needed for experimental studies. Ova from normal females of the same species are also requested.

Peter F. Bellinger
Osborn Zool.Lab., Yale University
New Haven 11, Conn., U.S.A.

FIELD TECHNIQUES FOR BUTTERFLY COLLECTING

by F. Martin Brown
Colorado Springs, Colorado

Now is the time for all good collectors to overhaul their gear and prepare for the coming season. Our able editor has on several occasions cocked an appraising eye at me and my gear as we have collected together in the Rockies and has asked me to write up my techniques for the Lep. News. Every collector has his own pet ways of doing things. My kit is very simple to gather together and I have found it works well for me in every type of locality from tropics to arctic.

Here are my tools: a net with several extra bags, a pair of "stamp tongs" on a piece of string and tied fast to me so I cannot lose them,a canvas fishing creel with the addition of a long leather thong made fast at the bottom so I can tie it around my waist and prevent the creel from swinging as I swing. In the creel are a half dozen or more of the flat type of tobacco can each with a number painted on it, two hundred or so of the cheapest glassine envelopes, a couple of vials with corks, a pint-size wide-mouthed bottle with absorbent cotton topped with cardboard in the bottom, and about two ounces of carbon tetrachloride. For years my net has been a type of fish-landing net frame that has a jointed bamboo handle, of which I rarely use the second joint. The bags are made of fine silk bobinet -- nylon is better if you can get it. They are deep enough so when I flip them they really close -- a depth of about two and a half times the diameter of the frame. The upper edge is made of tough unbleached muslin and this extends down about four inches -- it saves no end of bags. There is always an argument about color. I use what I can get -- usually white. It gets dirty soon enough! Others prefer grey or green -- not supposed to scare the butterflies! I don't use a killing bottle on my butterflies. I pinch them. The killing jar is toted for moths or whatever else that does not paralyze with a pinch. Always pinch with the wings away from you. Use the tips of your finger nails and be careful, particularly of gravid females. If you are not, you are likely to have a gooey specimen. I deliver the pinch through the net, having cornered the beast first. The stamp-tongs are used to lift the specimen from the net and place it in a glassine envelope. This is then popped into a tobacco can that I carry ready in my upper left shirt pocket. In the can is about a teaspoonful of paradichlorbenzene. I seem to get fewer "stiff" specimens, even of skippers, this way than with a killing jar. I never put into an envelope a specimen that has folded its wings down. These are turned to the proper position with the forceps while the animal is fresh and before it goes into the can.

When I change localities I change cans. By noting the number on the can I keep my localities straight. When I get to my base of operations -- home, cabin, tent -- I put up my "preserves". I do not like glassine envelopes for permanent storage. I make the good old-fashioned paper triangles. I find quite a bit of difference of opinion about the paper for these triangles. There is only one point upon which my friends are in agreement: NEVER USE CELLOPHANE. I like glassine paper because I can see through it well enough to sort my catch rapidly and it takes ink well. Against it is that the ink, especially rubber-stamp ink, dries slowly and that when you relax the specimens you must be careful about the humidity or the specimen will become wet. Others go to the other extreme and use cheap newsprint. I think it better acting in the relaxing box but otherwise it has these disadvantages: it is opaque and you have to open the triangle to see what is in it (this is very important if you are keeping stuff around in papers for years as I do); the surface takes pencil and rubber-stamping but takes ink poorly. Going back to the paper routine.- I usually have four sizes of papers already cut: 1" x 3" for small stuff; 1 1/2" x 4 1/2" for Pieridae, small Satyridae and Nymphalidae, large Theclinae and skippers; 2" x 6" for large Satyridae and Nymphalidae; and 3" x 8" for big things like Papilios. I make up a rubber stamp for my localities. For this I use a "Superior Swiftset" outfit. I include the name of the locality that I have used in my notes. This is carefully chosen so anyone who has the specimen and a reasonably good map, such as an oil company road map, can locate it. If I use the name of a stream I state how far it is from a town. I include the county, state, altitude (very important in the mountains) and date. A sample locality might read:

TAPPAN CREEK, 8500 Ft.
6.5 Mi. NW Lake George
Park Co., Colorado
16.vii.49

This might seem a lot to most collectors. Let me assure you it is the minimum for a collector who expects his material to be of use for some purpose other than a "stamp collection" of pretty objects.

After I stamp up enough papers of the right sizes for that material I have at hand I fold the triangles. As I transfer from the field envelopes to the triangles I put my field identification on the triangle with ordinary fountain pen. When I have all of the stuff from a single locality papered I make an impression of the locality label in my field-note book and write up my notes for that locality then turn to the next. It takes a lot of time but if a specimen is worth taking it is worth some pains to get it properly ticketed. Specimens with vague or indefinite data are just as useful as those without any data: NONE AT ALL. When my catch is papered it is transferred to large "powder papers" usually a genus or a family to a single paper. On the outside of this I put the locality and a list of the specimens in the package. Then these are put into a large friction top can with some paradichlorbenzene to await further processing during the winter. Out here there is no need to worry about moulds. In the tropics it's a totally different question, and I suspect that the same is true of some of the wetter parts of our country. There I use a drier after the material has been papered and only put bone-dry specimens into the storage cans.

[Ed.Note: Similar notes, as well as additions to this, are always invited for the News. C.L.R.]

COLLECTING A LITTLE-KNOWN PAPILIO

Douglas C. Ferguson
Nova Scotia Museum of Science
Halifax, Nova Scotia

Ever since reading Dr. McDunnough's original description of Papilio brevicauda bretonensis, I have been determined to collect the butterfly myself, and consequently made visits to the type locality at Baddeck, Cape Breton Island, almost every year since 1942. In late June, 1949, more ambitious and better equipped than previously, I set out accompanied by a museum assistant to make a quick survey of most of Cape Breton's shoreline. First we spent several days poling around the type locality, with the lack of success we had learned to expect. There were other things though, such as Glaucopsyche lygdamus mildredae F.Cherm., Boloria myrina terrae-novae Holl., Melitaea harrisii albimontana Avin., and we caught and examined two or three battered Papilio ajax L. (= polyxenes Fab.). Pieris napi oleracea Harr. was past its best, and Lycaeides argyrognomon aster Edw. (= Plebeius scudderii empetri Freem.), like Colias interior laurentina Scud., had barely begun to appear.

So we set out on July 2 to drive around the northern half of the island, via the only road — the famed Cabot Trail. As we preceeded northward a very few miles past Margaree Harbour, somewhere around Terre Noire, through the bleak treeless landscape so characteristic of French Acadian territory, I spotted two black swallowtails whirling in nuptial flight across the highway. They were rapidly being carried inland across the fields by the strong wind from the Gulf of St. Lawrence. I felt sure they were ajax but just in case, we stopped and got out the nets. The two butterflies were by now out of sight but we soon spotted a couple more, all seemingly coming from the same general direction -- the high cliffs bordering the rugged coast, here scarcely 200 yards from the road. We hastened over a barbed-wire fence and past a hayfield to reach the edge of the cliffs, but I lagged behind to net a few of the many aster flushed from a patch of Empetrum nigrum L. I think that within two minutes my companion, well ahead of me, came racing back, shouting: "It's brevicauda, it's brevicauda!" Sure enough, the butterfly he had in the net WAS BREVICAUDA — a female, in almost perfect condition. We hurried over to the spot where he had taken it and there were several others flying about, but all we caught were tattered. Here was a small patch of the food plant, Scotch Lovage (Ligusticum scothicum L.); scarcely two dozen plants were growing on and around a small stone pile near the very edge of the cliffs. We found ourselves looking down perhaps 100 feet to the pounding surf below, but sat down and began looking for larvae, with immediate success. In less than an hour the cans we carried for larvae contained at least 75 brevicauda caterpillars. There were more, but it was getting late and would soon be time to start the night's moth collecting.

The next day we searched, rather hurriedly, the vicinity of Cheticamp and took two brevicauda adults on roadside flowers (Iris sp.) less than a mile south of the town. There didn't seem to be any Ligusticum in the immediate vicinity. Later that day I saw an individual flying over a marshy meadow just back of the beach near Cap Rouge. In this spot L. argyrognomon aster was abundant, and a single G. lygdamus mildredae fell to my net. A few miles back (near the base of Cap Rouge) we had stopped to examine a patch of Ligusticum and couldn't find a trace of larvae or eggs.

From there on we travelled far without further success, through Cape North, Dingwall, Ingonish, Cape Smokey, to St. Ann Bay. Somewhere near Indian River (the villages aren't very well marked) on St. Ann Bay I noted a likely looking sand bar (cobblestone bar would be a better description; it was tough going under foot, and unbelievably hot -- well over 90° F.) separating a freshwater pond from the sea water. We found our way onto it through a churchyard near where the bar joins the mainland at its northern end. Fortunately our efforts were rewarded by a dozen or so very small larvae on a few scattered clumps of Ligusticum. No adults appeared. G. lygdamus mildredae was abundant around patches of Beach Pea (Lathyrus japonicus Willd.), and the tender stem tips were riddled by the larvae of this lycaenid.

On returning to Baddeck we made another search, thinking our powers of observation might have benefited from experience. Our suspicions about this found ample support in the results; namely about three dozen small larvae, the result of scarcely an hour's hunting. A few of these Baddeck larvae were not on the usual Ligusticum but on another large umbel, probably a Heracleum sp. These turned out to be rather dark larvae that later fed on Heracleum, and will probably produce adults of ajax.* The best larva-hunting in the Baddeck area seemed to be near the old home of Alexander Graham Bell, on the shore where the hill called Beinn Breagh meets Baddeck Bay. We found a rather varied growth of seashore plants there, which included Scotch Lovage, Convolvulus, Beach Pea and Poison Ivy. Between there and Baddeck we picked up a few more larvae, and found one on a small sand bar in front of the town. We made no attempt to return to the island opposite Baddeck, the actual type locality.

Before leaving Cape Breton Is. we made a second trip to Terre Noire, on July 6, and collected more eggs and larvae at the original patch of Lovage, bringing the total up to over 200. The larvae so infested these plants that I feel certain they would soon have eaten every leaf, and have nothing but death by starvation left, at least those that did not mature very quickly. The early stages present included everything from freshly laid eggs to last instar larvae. July 6th was partly sunny but cold, with a bitter wind sweeping in from the Gulf. As

---

*One emerged after this was written and is ajax.

we sat on the ground amid the Lovage, scrutinizing each leaf, our hands became numb with the cold, but in spite of the temperature I found a fine pair of adults in copulo resting in a sheltered nook among the rocks. My companion flushed and netted two others, but these proved to be dilapidated specimens. On foot, we covered at least two miles of shore-line in that vicinity, but failed to locate another plant of Ligusticum. In the boggy land behind the cliffs beautifully fresh specimens of Colias interior laurentina, L. argyrognomon aster, and Lycaena epixanthe amicetus Scud. would appear and fly about sluggishly in open spots amid the stunted Black Spruces, whenever the sun broke through.

When returning home, we came down the remainder of the west coast of the island, from Margaree Harbour, Inverness Co., to the Strait of Canso, with no further success.

HABITS OF PAPILIO BREVICAUDA

This Papilio is at home on the rugged coasts of the Gulf of St. Lawrence, and bretonensis, at least, is truly a sea-shore butterfly. The food plant grows just above high-tide mark, and as far as we were able to judge, the butterflies do not normally venture far from this zone. Colonies of the host plant are so scattered, that I think the females must habitually follow the coast-line, perhaps covering many miles daily, stopping briefly here and there to oviposit. Their flight is like that of ajax. Except in the mating flight or when frightened, they keep close to the ground, and fly up and down over the brow of the cliffs with such ease that it gives one the impression that they know thoroughly the routes followed. My companion chased one to the edge of the cliffs and all but kept on going. When the weather is severe they take shelter among, and probably under, the rocks, as do the larvae when they leave the plant to pupate. We found one empty pupa case under a stone in such position that the butterfly must have crawled up eight or ten inches through passages in the stone pile to reach the surface. Most were probably much deeper.

EARLY STAGES

The egg is almost globular, smooth, semi-translucent, and when laid is colored like a minute drop of honey that shows the first signs of crystallization. It turns dark and reddish, and finally lead-colored before hatching. The eggs are deposited on any part of the leaf, but mostly upon the upper side. They are fairly conspicuous against the glossy dark-green leaves, as are the larvae. The latter are black on hatching, but when 1/4 inch long or slightly more they develop the usual whitish "saddle". After a later molt they show the bands of the full-grown larva, but remain considerably darker until the final, or perhaps the second last, molt, when they turn a beautiful pale green, with relatively narrow black rings between the segments, and on each segment another black band that bears the yellow spots (these are never orange, as is often the case with ajax). The yellow spots appear never to be surrounded by the black band, but are free and adjacent to the green anteriorly, and occasionally so posteriorly. A few of the larvae from Baddeck were very dark and might produce ajax. Others from that area were pale, and agreed perfectly with the Terre Noire specimens. The larvae were carefully segregated so that we may be able to interpret the results correctly. They were easily reared, since the host plant grows in a Halifax park.

The chrysalis is very pale brown -- the color of dead grass, with a contrastingly dark lateral area extending from near the wing bases to the cremaster, and other dark markings in the vicinity of the head laterally and ventrally. They are darker and more contrastingly colored than most ajax pupae; some are faintly dusted with green along the outer wing margin, and on the abdomen laterally.

CONCLUDING REMARKS

Having finally observed at first hand the habits and peculiarities of this butterfly, which has so strange a distribution, I feel like reëmphasizing Dr. McDunnough's statement to the effect that brevicauda shows definite qualities that testify to its validity as a species distinct from ajax. Although they fly together in Cape Breton and at Tabusintac, N.B., there is little evidence of interbreeding. However, there is, in the writer's collection, a single tattered female from Baddeck that actually does show an odd mixture of characters, and is a possibly hybrid. This specimen is small for both species, has the hirsuteness and dull orange anal spot of brevicauda; the extent and brightness of the yellow wing-markings is intermediate, and the length of the single remaining tail suggests ajax.

FIELD NOTES

REARING NOTES FROM NOVA SCOTIA.- A larva found on the snow near Halifax on 19 February 1949 produced without further feeding, a Phragmatobia assimilans Wlk. on March 6. A lycaenid larva on Sweet Fern (Myrica asplenifolia L.) at Petite Riviere turned out to be Strymon melinus Hbn. Hemaris thysbe Fab. was bred from Viburnum cassinoides L., Polia assimilis Morr. from Sweet Fern, and Catocala coelebs Grt. from Myrica gale L.

Douglas C. Ferguson
Halifax, N.S., Canada

CATERPILLAR SURVIVES LONG IMMERSION.- During the summer of 1948, while I was raising a few Hemaris diffinis Bdv. larvae, a full grown larva somehow got into the jar of water holding the foodplant. I fished it out of the bottom in a turgid condition (it showed no signs of life), and laid it aside and about an hour later it was crawling around none the worse. It fed no more and completed its transformation. I don't know exactly how long it was submerged but it was at least 45 minutes. Apparently caterpillars do not drown easily.

S.E. Ziemer
Kewaunee, Wisconsin

FIELD NOTES - cont.

LEPIDOPTEROUS LARVAE ASSOCIATED WITH APHIDS.- While studying the life history of Taraka hamada Druce, a carnivorous lycaenid which feeds on the aphid Ceratovacuna (Oregma) japonica Takahashi on bamboo and allied plants, Mr. Toshio Tsuchida found among the aphids some syrphid grubs and lepidopterous caterpillars (Oedematopoda).

On August 14, 1939, in Shui-Nasu, about 180 kilometers north of Tokyo, while collecting aphids for my Taraka larvae, I noticed a strange lepidopterous caterpillar running swiftly away from its cobwebby nest among the clusters of aphids. The caterpillar fed on aphids and pupated in captivity. The pupa was about 10 mm. in length, slender and reddish. It produced a tiny moth with spiny legs.

On July 2, 1942, in a small bamboo thicket in Tokyo I met the same caterpillar for the second time.

Tarō Iwase
Kamakura, Japan

EREBUS AND THYSANIA IN CONNECTICUT.- Records from northern North America of these giant tropical and subtropical noctuids are always of interest, and two recent Connecticut captures are reported here. One of each species was taken in deciduous woods in the same precise locality at moth bait in the evening. Both were wary and had to be netted. The records are:

Erebus odora (Linné). Greenwich, Conn., 11 July 1941, leg. Paul and Daniel Starrett.

Thysania zenobia (Cramer). Greenwich, Conn., 3 August 1941, leg. Paul and Daniel Starrett.

C.L. Remington
New Haven, Conn.

REARING EUROPEAN LEPIDOPTERA IN OHIO.- A gorgeous, very large ♀ of Endromis versicolora (L.) (Kentish Glory) emerged from her cocoon Dec. 27th, 1949. I think this will be of interest to American rearers of exotic Lepidoptera. On last April 30th, ova of E. versicolora received from Mr. J.B. Smartt of Eire (he received them from Germany) hatched. I fed the larvae white birch. On May 24th, the first larva turned red, evacuated, and began spinning among debris and soil in the bottom of the cage. It finished spinning on May 25th. The last one spun on June 1st. Now the perfect insect has completed the cycle. I also have Aglia tau (L.) cocoons (Germany ex-ova, larvae fed on beech) and Dicranula vinula (L.) (Puss Moth) (from Eire ova). Usually my reared moths exceed wild species in size.

Hazel Chase
Galion, Ohio

George Ehle, Lancaster, Pa., reported a fresh ♂ Asterocampa clyton (Bdv. Lec.) apparently attempting to copulate with a worn ♀ A. celtis (Bdv.&Lec.) 17 July 1949.

BUTTERFLY FLYWAYS AND PLAYGROUNDS *.- In Virginia Papilio cresphontes Cram. frequents definite flyways through open woods. These flyways are narrow, 100 to 150 feet wide, but they may be very long. The butterflies course rather rapidly along them with continuous wing beats, from four to six feet above the ground, dodging with surprising dexterity through undergrowth, and passing swiftly and directly across open spaces. This species may be common in a flyway though rarely seen elsewhere. All the flyways I have observed have been near and parallel to the Potomac and Shenandoah rivers and an inlet near Lynnhaven. In the middle of May I found this butterfly common in a narrow flyway along the Shenandoah six miles south of Front Royal. All the individuals were flying northeast, and all caught were males. They were observed only in the morning. Earlier in the season Iphiclides marcellus (Cram.) may be observed in some of these flyways.

The males of Papilio polyxenes Fab.(= ajax auct.) frequent definite playgrounds, usually barren hilltops, especially if crowned by a few trees, flying around them with considerable speed. Similar, though not the same, hilltops are frequented by the males of the species of Thorybes, which fly swiftly back and forth, occasionally pursued by Strymon titus (Fab.). Where no hills are available P. polyxenes will fly back and forth along the edge of a wood. Pyrgus communis (Grote) also uses playgrounds along the borders of woods.

Austin H. Clark
Washington, D.C.

*Other notes on butterfly flyways have appeared in the Lep. News as follows: vol.2, p.92 (Ehrlich); vol.3, p.25 (Klots) and p.62 (Esaki).- Ed.

OBSERVATIONS ON NYMPHALIDAE HIBERNATING ON VANCOUVER ISLAND.- It is a rather remarkable fact, which holds true in this district at least, that nearly all the Nymphalidae which are common in the early spring, are little seen in the late summer or autumn. There are exceptions but these are species which are strongly migratory and very irregular in their appearance. The two species I have in mind are Vanessa cardui L. and Nymphalis californica Bdv. The latter species does not breed here at all, but occasionally appears in large migrating flights, and overwinters on the coast. V. cardui seems to breed and thrive here once established, but disappears for years at a time. This species showed up in numbers in the spring of 1949 after a long absence, and the next generation was conspicuous from July on.

When we consider the species of less marked migratory habits, we get a different picture. Nymphalis milberti Godt. illustrates this fact most clearly. I very occasionally see fresh N. milberti in September; I have no record of seeing them earlier. In the spring they are always common. When I secured larvae of this species and reared them, they completed their metamorphosis in July. Where then, between July and frost, are all these butterflies that show up so abundantly in the spring?

My rearing of Polygonia shows that they mature about the same time as N. milberti. They are some-

what more common in the autumn and I have seen fresh specimens in July. But the strange circumstance is still noticeable, they are much more abundant in the spring. One other species that can be mentioned here is Nymphalis antiopa L. This butterfly is not common here. I have seen them in the spring only, unless I include one found hibernating under bark on a dead stump, in January.

It would be interesting to know whether these observations hold true in other parts of the country. One explanation might be that few larvae mature here, and the survivors are reinforced by spring migrants. The objection to this theory is, of course, that the proper food plants being always plentiful, no reason can be given for the larvae dying off. The more probable answer is aestivation, or what would amount to a dormant period occupying the entire late summer and autumn as well as winter.

Richard Guppy
Wellington, B.C.

NOTES ON MICHIGAN RHOPALOCERA.- 1949 observations on certain species of special interest appear to be worth recording.

Lycaena helloides (Bdv.): Foodplant of a small colony just east of Ypsilanti, Washtenaw County, Polygonum sp., tentatively identified as P. Careyi Olney. Although several other Polygonum occur in the region none was observed to provide larval food for helloides.

Strymon caryaevorus McD.: First taken in 1948, this is the first record of the species for Michigan (genitalic determination). Apparently flying with falacer. The two were taken together near Ypsilanti, and collecting was done (a) in small, sunlit, bushy clearings in an oak-hickory wood, where they were seen to perch on leaves generally 1-3 meters above ground, in the sun; (b) on flower heads of Daucus carota L. (Queen Anne's Lace) in the sun, immediately adjacent to the above wood; (c) occasionally on a species of milkweed immediately adjacent to another wood. No field identification of caryaevorus was made, so it is impossible to say whether or not they actually frequented the same spots together.

Asterocampa celtis (Bdv. Lec.): Second generation species observed in the Ypsilanti locality, somewhat past their prime, on 14 August, only in immediate vicinity of an isolated hackberry tree(mostly on and about the leaves of this same tree, and only on the sunlight side).

Poanes massassoit Scud.: A small colony of this species, apparently restricted to an area not much over 25 square meters, was observed (3 July) in a grassy, moist depression some 20 meters from Cavanaugh Lake (Washtenaw County), beside a passing road. Not very abundant: about 10 specimens seen in an hour's search.

Thymelicus lineola (Ochs.): Collecting has extended the known range of this interesting species to western Washtenaw County and northern Lenawee County. In both areas it was far less frequent than in eastern Washtenaw County, and it is suspected that the former areas mark the approximate western limit.

Harry K. Clench
Willow Run Village, Mich.

ON PAPILIO AND DANAUS IN THE NIAGARA PENINSULA.-

Papilio cresphontes Cram. Quite abundant in and around "Rockway" locality, Ontario, in 1939-40-41, feeding on Prickly Ash (Xanthoxylon). Latest larvae collected in October 1940; hatched in May 1941. None were observed from 1945, (year of my military discharge) to 1949.

Papilio philenor Linné. Fairly common until 1947, causing many complaints to owners of Dutchman's Pipe (Aristolochia) vines in St. Catharines. In 1946 I raised nearly 50 larvae and wintered the chrysalids successfully until March 1947. Not one emerged, although the perfectly formed insects remained inside the chrysalids. I peeled off the shell in a number of cases to show people how the butterfly looked prior to hatching. All were perfectly formed but completely dried out. No vines were affected by larvae and only one specimen was seen flying in St. Catharines since 1946.

Papilio marcellus Cram. I have observed one specimen only. It flew by me in April 1946. My net was two miles away.

Danaus plexippus Linné. I have been observing this since 1945 and I can report three items of interest: (a) Third weekend September 1946 - Rockway, Ontario.: in moist gully, suspended on wild aster - area approximately 6 feet square - 45 specimens; time and clothing worn at time would not permit closer study; all appeared to be in good condition. (b) Within 100 yards of same spot on continuation of same gully, approximately 600 specimens were seen, suspended from sumac, elm, maple, and other small shrubs; time - third week of August 1949. (c) McNab, Ont.: account by school teacher: "While sitting on front porch of summer cottage about 1 p.m. on Aug.28, 1949, I was startled to see a huge swarm of 'King Billies' (= Monarchs = Danaus plexippus) appear from nowhere in particular and alight in a huge cluster on the lower branches of a maple not fifty feet from where I was sitting. Since I had never observed anything like it before I continued to watch. Finally all the butterflies seemed to settle down to the extent that unless someone actually knew where to look for them a casual observer would never be aware of their presence. Occasionally, as another Monarch flew within the vicinity, the whole branch became alive with hundreds of wings flapping — giving the branch the appearance of someone shaking it. When the stray joined the group, all became quiet again."

E.G. Bailey
St. Catharines, Ontario

Response to Mr. Shappirio's request for names and addresses of dealers in Lepidoptera, especially outside the U.S.A., has thus far been weak. Such a list will be of great value to many Society members and will be published in the Lep. News. Information is particularly sought on such important pre-war dealers as Staudinger and Bang-Haas. Please jot down on a card all dealers known to you and send it immediately to:

Mr. D.G. Shappirio
4811 17th Street, N.W.
Washington 11, D.C., U.S.A.

COLLECTING IN THE U.S.A. NATIONAL PARKS

Many collectors who are laying plans for the summer may not be aware of the regulations that govern collecting of animal life in the National Parks and Monuments. Some who are familiar with the procedures of past years are not aware of the change instituted by Field Order 768, June 17, 1949, of the National Park Service.

In a nutshell, the requirements now to be met by an applicant for a permit to collect animal life in the areas under the supervision of the National Park Service are these:

1. The collector must be a Federal employee.

2. The collecting must be for the benefit of the Park or for Science.

3. The specimens collected must be deposited in a museum or in the collections of scientific or educational institutions and made available to the public.

Items 2 and 3, above, have always been among the requirements. Unfortunately some of the collectors who were granted permission to collect in the National Parks under the former generous interpretation of the National Park Service Act of 1916 paid little attention to these requirements.

Mr. John E. Doerr, Chief Naturalist for the National Park Service, in a letter dated December 27, 1949, has expressed his opinion to me that the present ruling is not disadvantageous to the Park Service or to research. He states in reply to a specific question: "Insects census work can be undertaken by any Federal employee who possesses the necessary permit which can be issued at the discretion of the superintendent. When a census is necessary and Federal employees cannot undertake the work, qualified specialists may be authorized to conduct the study by their appointment of collaborators without compensation." This is a clear statement that unless the National Park Service deems a census of some particular group of insects -- or any other animal life -- necessary there is little use for you to ask for appointment as a "collaborator without compensation". I am sure that a qualified specialist, working on a particular problem that involves areas under the supervision of the National Park Service, would have little difficulty getting full cooperation from the Service in being appointed "collaborator without compensation".

F. Martin Brown
Fountain Valley School
Colorado Springs, Colo.

The British colony of Sarawak has just issued a pictorial series of postage stamps. The one cent of this new series has as its central design the butterfly Troides brookiana - the famous and striking Rajah Brookes' Birdwing originally discovered by A.R. Wallace. The scientific name is given on the stamp.

THE RE-DISCOVERY OF A FRENCH PARNASSIUS

H.E. Woodcock, of Chicago, has sent us an account from his correspondent, M. Henri Stempffer, of Paris, of the rediscovery of a remarkably isolated colony of Parnassius mnemosyne. The substance of M. Stempffer's delightful writing follows. The colony was discovered about 40 years ago by an Englishman, Harold Powell, in an isolated meadow of the Sainte Baume range near Saint Cassien, a little hamlet in Provence (S.E. France). The "race" was named cassiensis by Siepi. The holotype was apparently lost subsequently and only 2 specimens in the Paris Museum and 1 in the British Museum remained. In spite of many later attempts by Marseillean lepidopterists to collect cassiensis, it was considered extinct until June, 1949, when M. Stempffer came upon the very spot "quite by chance". The type locality was not precisely known because of the inexact reference in Siepi's paper. M. Stempffer discovered it after three hours of rather rugged climbing up the Sainte Baume hills through thick growth. The flight area is a natural meadow and a narrow strip of steep slope, in all less than 1 kilometer long and 50 to 200 meters wide. It is at about 1000 meters in altitude and is at the upper edge of the dense forest of Sainte Baume. There is no striking difference between cassiensis and the race of P. mnemosyne of the Alps, but the isolation of the colony in thoroughly inhospitable surroundings is of exceptional interest. In the Alps and Pyrenees, P. mnemosyne flies at fairly high altitudes (1800-2000 m.) in wet meadows. In contrast, cassiensis lives at half that altitude and in a much drier environment. During the Glacial Epoch the entire Provence was covered with thick oak-beech-yew forests and wet meadows, and mnemosyne must have been widely distributed there. Since then the climate has become warmer and drier, and the forests have been almost entirely lumbered off. Now the Provence appears bare and rocky except on the northern slope of the Sainte Baume range, where a religious shrine has caused the forest to be spared and it has remained unchanged for perhaps a thousand years. The surrounding land keeps cassiensis completely isolated from the nearest Alpine colonies of mnemosyne, at least 100 kilometers away.

C.L.R.

A CORRECTION

Dr. J.H. McDunnough has kindly called my attention to an error in my note to a paper abstracted by me in the Lep. News, vol.3: p.109, #251, respecting the gender of Malacosoma. This compound word is not derived from the Latin, as I erroneously supposed, but from the Greek adjective, malakos (μαλακος) and noun, soma (σῶμα). Since soma is neuter in Greek, the combination Malacosoma fragile is correct. (C.dP.)

ERRATA: Vol.III: p.94 in Payne, Ohio, notes, substitute "Pale and worn" for "Hibernating" in the sentence: "Hibernating specimens appeared in numbers in early May."

QUESTIONS AND ANSWERS

Q. "Do you believe that 'industrial melanism', as British writers call it, explains dark forms in American moths?"

A. Yes. In this country such forms were very common in the vicinity of Pittsburgh many years before they began to appear in numbers elsewhere. But I cannot explain why industrial areas should cause inheritable melanism.

Q. "I have noticed on specimens of Parnassius clodius, the species which commonly occurs on Vancouver Island, a peculiar growth attached to the extremity of the abdomen. I have seen this growth on no other species, except that on a specimen of Parnassius mnemosyne from Switzerland I found the same object. From this meagre evidence, it appears to be a peculiarity of the genus Parnassius. The growth resembles nothing so much as a piece of human fingernail, curved so as to grip the abdomen. It does not seem to be attached thereto, and can often be removed without damage to the butterfly. I hope that through the medium of your question and answer department, you can explain the reason for this peculiar growth."

A. This is the 'seal' or sphragis. It is secreted by the male at the end of mating and sets, preventing a second mating. Several other genera of Papilionidae have it, including one or two South American species of Papilio; also the Acraeine Nymphalidae. It probably exists internally in some other forms where it does not show; but many Lepidoptera can mate repeatedly.

W.T.M. Forbes

THE NOMENCLATURE CONTROVERSY - REBUTTAL

The statement by a group of taxonomists in Washington published in Science was in part presented in the last issue of the Lep. News (vol.3: p.104). Vigorous replies to the criticisms of the Washington group appeared in Science, vol.111: pp.234-238; 3 Mar. 1950, and the substance of them follows.

Francis Hemming, Secretary to the International Commission on Zoological Nomenclature, carefully and in some detail argued: 1) that the Paris actions were in fact preceded by preliminary consultation including extended discussions with the Washington group itself; 2) that the alternates, appointed to replace at a congress non-attending permanent members, have legally as full voting rights as permanent members of the Commission; 3) that it is inadmissable that the control of the Commission by the International Congress of Zoology be reduced to a formality and that the Congress would not "tolerate for an instant such usurpation of its rights"; 4)that the minutes of the Paris meetings will be published soon [have in fact begun to appear - C.L.R.], that the revised text of the code "will be promulgated at the earliest possible date", and that "a reasoned statement" of serious objections will be welcomed for consideration at the next Congress [Copenhagen, 1953].

Mr. Hemming said nothing about the contentions that approval at Paris was given only "in principle" and actual wording left to "a committee of jurists" or that the actions at Paris had not been presented for "prior study and approval by the regular commissioners", nor did he attend to the crucial point of "obfuscations regarding 'mandates from the Congress'".

However, in a very strongly worded letter, Edward Hindle and N.D. Riley, alternates from Great Britain on the Commission at the Paris meetings, presented refutations of the "committee of jurists" point, declaring that a jurist is "more competent" than the commissioners to "translate these decisions and amendments into formal language." They added that it is "nonsense" to say that there is no provision for the Congress to review the work of the Commission, that the regular Commission is "able to review its own work to its heart's content", that the commission attending the Congress is not a "specious substitute" but is actually the same commission which is continually in existence, and that they are sure the opinions expressed by the Washington group are not shared by zoologists in Britain or in any other country.

In a much more tempered letter, Prof. L. di Caporiacco, of Italy, a member of the International Commission, also supported "the capacity of the alternates to fulfill their tasks". He, too, brought out several of the points mentioned by Mr. Hemming and called for publication of the revised rules without delay. Similarly, Henning Lemche and Ragnar Spärck, of Denmark, disagreed with the Washington group and reported that: "In Scandinavia, ... the results obtained at the Paris meeting have been fully accepted and warmly welcomed."

Prof. Pierre Bonnet, of France, also supported the actions in Paris but his letter was not published in Science because of duplication.

A letter by Karl P. Schmidt, for a nomenclature discussion group in Chicago, called for extensive development of the concept of nomina conservanda. Little was said relating specifically to the points of the Washington group.

Prof. J.C. Bradley, one of the U.S.A. regular commissioners who attended the Paris meetings, also contended that more than adequate advanced notice was given by Mr. Hemming, that "the principles adopted were clear" and not likely to be changed by the jurists, that the representation at Paris was international and of high quality and gave unanimous support to all points reported to the Congress. He added that: "The secretary [Hemming] suggested the Washington group await appearance of the minutes before they published anything. It is regrettable that they have not seen fit to do so." The reviewer, on the other hand, believes that it is much better that the fermenting controversy is now in the open where the views of both sides can be carefully studied and fact separated from hearsay or "obfuscating" verbiage. Compromise and agreement seem at last much more hopeful to the writer. Any unbiased reader of these two numbers of Science will probably be impressed by weaknesses and strong points on both sides.

C.L. Remington

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped eventually that our coverage of the world literature will be virtually complete. It is intended that every paper published since 31 December 1946 will be included. In the first three volumes of the Lep. News 886 were listed. Abstracts give all new subspecies and higher categories with generotypes and type localities. Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members and the many recently received are gratefully acknowledged. Initials of cooperating abstractors are as follows: (P.B.) - P.F. Bellinger; (A.D.) - A. Diakonoff; (C.dP.) - C.F. dos Passos; (L.G.) - L.A. Gozmány; (G.dL.) - G. de Lattin; (C.R.) - C.L. Remington ; (T.S.) - T. Shirôzu. A complete set of these pages, for clipping and filing, may be obtained for Vol.4 for $0.50.

1. Agenjo, R., "Nueva especie pirenaica del género Crambus F. (Lep. Cramb.)" (In Spanish). Eos, vol.23: pp.7-15, 1 pl. 15 May 1947. Describes as new: C. bolivari; C. b. form uniformis (Lérida, Spain). Figures both, as well as the related C. radiellus and the genitalia of bolivari and radiellus. This paper would serve well as a model for all species descriptions. (P.B.)
2. Agenjo, R., "Euzophera pinguis (Hw.) no citada de España y de la que es nueva sinomimia E. nelliella Rag., plaga del olivo en Nijar (Almeria)" (In Spanish). Eos, vol.23: pp.33-38, 1 pl. 15 May 1947. Reduces nelliella to subspecies of pinguis; figures adults and several aspects of genitalia to support action. (P.B.)
3. An Old Moth Hunter, "The Oak Prominents." Ent. Rec. Jour. Var., vol.59: pp.71-75. June 1947.
4. Anonymous, "The Potato Moth (Gnorimoschema operculella)." Agr. Gaz. N.S. Wales, vol.58: pp.81-84, 6 figs. 1 Feb. 1947.
5. Anonymous, "The Indian Meal Moth (Plodia interpunctella)." Agr. Gaz. N.S. Wales, vol.58: pp.155-156, 1 fig. 1 Mar. 1947.
6. Anonymous, "The White Cedar Moth (Lymantria reducta)." Agr. Gaz. N.S. Wales, vol.58: pp.270-271, 1 fig. 1 May 1947.
7. Anonymous, "The Bag Shelter Moth (Ochrogaster contraria)." Agr. Gaz. N.S. Wales, vol.58: pp.305-307, 4 figs. 1 June 1947.
8. Antram, Chas. B., "Polyommatus (Lysandra) coridon aberrations." Ent. Rec. Journ. Var., vol.61: pp. 110-111. Nov. 1949. Records 17 forms captured. (P.B.)
9. Antram, Chas. B., "Collecting at the Canopy or Roof-top of the Forest." Ent. Rec. Journ. Var., vol. 62: pp.11-12. Jan. 1950.
10. Arnett, Ross H., Jr., "Locality Labels." Coleop. Bull., vol.3: pp.85-88. 14 Dec. 1949. Discussion of importance of detailed labels. (C.R.)
11. Baker, W.A., W.G. Bradley, and C.A. Clark, "Biological control of the European Corn Borer in the United States." U.S.D.A. Tech. Bull., no.983: 185 pp., 40 figs. Dec. 1949. Discusses biology of native and imported parasites and importance of disease and known predators. (P.B.)
12. Beard, Raimon L., "Experimental Observations on Coagulation of Insect Hemolymph." Physiol. Zool., vol.23: pp.47-57. Jan. 1950. Experiments done on larvae of Japanese beetle and Galleria mellonella. Explanation of the process, which is not comparable to coagulation in vertebrates, is not possible at present. (P.B.)
13. Beebe, William, "Migration of Papilionidae at Rancho Grande, North-central Venezuela." Zoologica (N.Y.), vol.34: pp.119-126, 1 pl. 30 Nov. 1949. Detailed records for many months of migration through Portachuelo Pass of 17 spp. of Papilio: anchises; anchisiades; agesilaus; arcas; cleotas; erithalion; lycophron; paeon; polyxenes; protesilaus; sesostris; torquatus; belus; crassus; phaon; polydamus; thoas. Plate is photo of all spp. (C.R.)
14. Beirne, Bryan P., "Lepidoptera and 'Honey-dew'." Ent. Rec. Journ. Var., vol.59: pp.25-26. March 1947. Relation between abundance of aphids and scarcity of Lepidoptera suggested. (P.B.)
15. Beirne, Bryan P., "The Effects of Human Activities on the Distribution and Abundance of the Lepidoptera." Ent. Rec. Journ. Var., vol.59: pp.37-42. April 1947. Discusses effects of clearing vegetation, reclamation projects, increase of insectivorous birds, etc. (P.B.)
16. Beirne, Bryan P., "Changes in the Distribution and Abundance of the Lepidoptera." Ent. Rec. Journ. Var., vol.59: pp.65-66. June 1947. Possible causes of 'outbreaks' and role of vegetation changes in altering distribution. (P.B.)
17. Bentall, E.E., "Continental Papilio machaon reared in England." Entomologist, vol.80: pp.41-43. Feb. 1947.
18. Berg, Clifford O., "Limnological Relations of Insects to Plants of the genus Potamogeton." Trans. Am. Micro. Soc., vol.68: pp.279-291. Oct. 1949. Discusses the relations of insects reared from 17 spp. of Potamogeton to the plants. 4 spp. of Nymphula are among the 42 insects discussed. (P.B.)
19. Bird, J.F., "Collecting at Home; Records of a Rainy Season at Clevedon." Ent. Rec. Journ. Var., vol.59: pp.42-45. April 1947.
20. Blair, K.G., "Cosymbia pupillaria Hübner (Lep., Sterrhidae) in the Isle of Wight." Ent. Month. Mag., vol.83: pp.29-30. Jan. 1947. Records sp., new to Britain; describes egg, young larva, and adult; food plant: myrtle. Original spelling of name is "puppillaria" -- meaningless and probably an error -- but corrected form is preoccupied -- a knotty problem. (P.B.)
21. Bohart, Richard M., "Soil webworms and other lawn pests in California." Hilgardia, vol.17: pp.267-308, 20 figs. March 1947. Detailed morphology and biology of Crambus sperryellus and C. bonifatellus; notes on some other insects. (P.B.)
22. Bourgogne, J., "Remarques sur le genre Amieta (sensu lato) et détermination de la position systématique d'Amieta Ecksteini Led. (Lep. Psychidae)" (In French). Bull. Soc. Ent. France, vol.54: pp. 98-103, 8 figs. July 1949. Discusses Amieta and Amictoides, with figures of important characters. Places ecksteini in Acanthopsyche, on the basis of genitalia and other characters (figured). (P.B.)
23. Bourgogne, Jean, "Un type nouveau d'appareil génital femelle chez les Lépidoptères" (In French). Ann. Soc. Ent. France, vol.115: pp.69-80, 12 figs. Dec. 1949. Finds two genital apertures in all spp. of Hepialidae studied; the connection between bursa and oviduct is external in European spp. but becomes internal in some others by fusion of the lateral lips of the intergenital area (as found by Oiticica in Trichophassus). (P.B.)
24. Bretherton, R.F., "Butterflies near Paris, Geneva, and Annecy, 1948." Ent. Rec. Journ. Var., vol.61: pp.97-100. Oct. 1949.
25. Bretherton, R.F., "Spring Butterflies in Bohemia." Entomologist, vol.82: pp.254-255. Nov. 1949.
26. Bretherton, R.F., "Butterflies in Var and Basses Alpes, France." Ent. Rec. Journ. Var., vol.61: pp. 121-124. Dec. 1949.

27. Brooks, C. Joslin, "New Subspecies in the Genera Faunis, Aemona, Stichophthalma, and Enispe, with Revisional Notes." Entomolcgist, vol.82: pp.256-259, 1 fig. Nov. 1949. Describes as new: F. aerope masseyeffi (Cochin China); A. amathusia cochinensis (Cochin China); S. camadeva amydas (Burma); S. canadevoides 'form' hyacynthus (Assam); S. howqua iapetus (Cochin China); S. neumogeni regulus (Cochin China); E. euthymius sychaeus (Cochin China). Only the wing pattern is described. Several species and subspecies of Euthymius are rearranged after a study of the genitalia (figured in part for four forms). (P.B.)
28. Burmann, K., "Interessante Beobachtungen bei nächtlichen Lepidopterenanflügen im Nebel in den Otztalalpen" (In German). Ent. Zeitschr., vol.59: pp.129-131, 139-141. 1-15 Dec. 1949. While most of the moths fly to light during the fog-free time, a lot of species (especially Plusia gamma and Agrotis ypsilon) came during the fog. (G.dL.)
29. Campbell, J.L., "Macrolepidoptera from Knapdale (Argyllshire)." Entomologist, vol.82: pp.234-235. Oct. 1949.
30. Caron, J.B., "Een geslaagde kweek van Aglia tau L." (In Dutch). Ent. Berichten, vol.13: pp.3-4. 1 Jan. 1950.
31. Carpenter, G.D. Hale, "Pseudacraea eurytus (L.) (Lep. Nymphalidae): A study of a polymorphic mimic in various stages of speciation." Trans. R. Ent. Soc. London, vol.100: pp.71-133, 8 pl., 1 map, 28 figs. 28 July 1949. Gives synonymic history of genus and species; lists and describes all forms. Describes following forms as new: stavelioides (Nigeria); hemixanthe, infumata, grisea, jacksoni (Uganda); pondo (Cape Province). All forms are figured and their distribution given. Both sexes of this species mimic spp. of Bematistes (Acraeidae); polymorphism is comparable to that in Papilio dardanus. Relationship between mimic and models is discussed, and its bearing on theories of mimicry noted. Unfortunately the models are not figured. (P.B.)
32. Carr, F.M.B., "Notes on Collecting Lepidoptera in 1946." Entomologist, vol.80: pp.153-158. June 1947.
33. Caspari, Ernst, "Serological differences between a^+a^+ and aa Ephestia." Genetics, vol.35: pp.100-101. 10 Jan. 1950. Abstract only.
34. Classey, E.W., "Diacrisia lubricipeda ab. haggetti ab. nov. (Lep. Arctiidae)." Entomologist, vol.80: p.146, 1 fig. June 1947.
35. Chermock, Ralph L., "A generic revision of the Limenitini of the world." Cornell Univ. Abs. Theses, 1947: pp.251-253. 1949. Abstract; paper is in press in Am. Mid. Nat.
36. Cockayne, E.A., "Abrostola tripartita, Hufn. and its forms in Britain." Ent. Rec. Journ. Var., vol. 59: pp.14-15. Feb. 1947.
37. Cockayne, E.A., "Cosymbia pupillaria, Huebner, in the Scilly Isles." Ent. Rec. Journ. Var., vol.59: pp.55-56. May 1947.
38. Cockayne, E.A., "Two Unrecorded Rarities: Hadena (Dianthoecia) compta, F., and Leucania loreyi, Dup." Ent. Rec. Journ. Var., vol.59: p.58. May 1947.
39. Cole, A.C., "Illustrated Keys to the Immature Forms (Exclusive of Egg, Nymphs, and Pupae) of the more Common Orders and Families of Tennessee Insects." Journ. Tenn. Acad. Sci., vol.22: pp.28-44, 2 pls. Jan. 1947. Includes keys to larvae of 18 families of Lepidoptera. (P.B.)
40. da Costa Lima, A., "Sobre Endoparasitos de Thecla basilides (Lep., Lycaenidae)" (In Portuguese). An. Acad. Brasil. Cien., vol.19: pp.277-281, 1 pl. 1947. Describes a new larvaevorid parasite. (P.B.)
41. Curran, C.H., "Clothes Moths." Natural History, vol.58: pp.325-331, 6 figs. Sept. 1949. Popular account of Tinea, Tineola and Trichophaga. (P.B.)
42. Daniel, F., "Mit welchen Organen nehmen Nachtfalter künstliche Lichtquellen wahr? — Eine Erfahrungszusammenstellung mit der Bitte um Bekanntgabe weiterer Beobachtungen" (In German). Ent. Zeitschr., vol.59: pp.153-157. 15 Jan. 1950.
43. Darlow, H.M., "Collecting Notes for 1946." Ent. Rec. Journ. Var., vol.59: pp.53-55. May 1947.
44. Darlow, H.M., "Observations on the Genus Euphaedra Hübn. (Lep. Rhop.) in Sierra Leone." Entomologist, vol.82: pp.193-200. Sept. 1949.
45. Darlow, H.M., "Observations on the Life Histories of Certain Butterflies of Freetown, Sierra Leone." Ent. Rec. Journ. Var., vol.61: pp.126-129. Dec. 1949. More or less complete descriptions of early stages of following spp. (food plant in parentheses): Mycalesis vulgaris (grasses); Charaxes boueti (bamboo); Acraea zetes (Modeca palmata); A. terpsichore; Papilio demodocus (citrus trees); P. pylades; Platylesches picanini; Coeliades forestan. (P.B.)
46. Daviault, Lionel, "Notes sur la biologie et les parasites du porte-case du mélèze (Coleophora laricella Hbn.) dans la province de Québec" (In French). Ann. de l'Acfas, vol.15: pp.90-92. 10 Oct. 1949.
47. van Deurs, W., "Nye og sjaeldne Sommerfugle i 1948" (In Danish). Ent. Meddelelser, vol.25: pp.327-329. 1 Sept. 1949. New records for Denmark. (P.B.)
48. Doets, C., "Lepidopterologische mededeelingen over 1946-1948" (In Dutch). Ent. Berichten, vol.12: pp. 413-417. 1 Sept. 1949.
49. Eliot, N., "Autumn Decrease of Some Riviera Butterflies and Migrating Pieris brassicae." Entomologist, vol.82: pp.245-250. Nov. 1949.
50. Fearnehough, T.D., "Rearing Argynnis (Issoria) lathonia." Ent. Rec. Journ. Var., vol.61: pp.109-110. Nov. 1949. Records emergence of imago 10 days after hatching of egg! (P.B.)
51. Fletcher, D.S., "Notes on Some European Species of Selidosema (Lep. Geometridae)." Entomologist, vol.82: pp.217-222. Oct. 1949.
52. Fraenkel, G., and K.M. Rudahl, "The structure of insect cuticles." Proc. R. Soc. London (B), vol.134: pp.111-143, 33 figs. 7 Jan. 1947. Study of the structure, chemistry and mechanisms of hardening and darkening of cuticle. The latter processes are mainly brought about by addition of phenolic substances derived from tyrosine in blood, though process may be somewhat different in soft, unpigmented cuticles. Experimental work done mostly on Sarcophaga, but several Lepidoptera also mentioned. (P.B.)
53. Freeman, H.A., "A New Species of Hairstreak and New Records for the United States." Field and Laboratory, vol.18: pp.12-15. Jan. 1950. Describes as new Strymon buchholzi (Tamaulipas, Mexico). 5 new records for the U.S. (P.B.)
54. Freeman, H.A., "Further observations on Calpodes evansi Freeman (Lepidoptera, Rhopalocera, Hesperiidae)." Field and Laboratory, vol.18: pp.15-17, 1 pl. Jan. 1950. Adult figured. (P.B.)
55. Gabriel, A.G., "Notes on the Rhopalocera of Abyssinia." Proc. R. Ent. Soc. London (B), vol.18: pp. 207-216, 1 pl. 15 Dec. 1949. Describes as new: Acraea pseudolycia astrigera ♀ f. auasa; A. guichardi; A. safie ♀ f. tillini; Anthene janna; Lepidochrysops guichardi; Papilio dardanus antinorii ♀ f. alameitu; Euphaedra cooksoni attenuata. Figures all but the last. Notes on other spp. (P.B.)
56. van Galen, H.G., "Weer een nieuwe Geometride voor Nederland" (In Dutch). Ent. Berichten, vol.12: p. 359. 1 April 1949. Eupithecia expallidata. (P.B.)
57. Gerasimov, A.M., "Guseniuy Ikukolki Ognevok (Pyralidae Lepidoptera). I." [Larvae and pupae of the pyralids] (In Russian). Ent. Obozrenie, vol.29: pp. 165-181, 7 figs. 1947. Keys to subfamilies and to spp. of Pyralidae. (P.B.)

58. Ghélélovitch, Sabbas, "Deux sporozoaires parasites d'Ephestia kühniella Z." (In French). C. R. Acad. Sci., vol.224: pp.685-687. 3 March 1947. Describes Coelocystis ephestiae n. gen. and sp.; also records a species of Nosema. (P.B.)

59. Goldschmidt, Richard, "The interpretation of the structure of triploid intersexes in Solenobia." Arch. Julius Klaus-Stiftung, vol.21: pp.269-272. 15 Feb. 1947.

60. Goldschmidt, Richard B., "Phenocopies." Scientific American, vol.181: pp.46-49, 2 figs. Oct. 1949. Discussion of morphological changes produced by the environment but simulating mutations. Temperature effects on butterfly wing patterns are briefly considered. (P.B.)

61. Goldschmidt, Richard B., "The Interpretation of the Triploid Intersexes of Solenobia." Experientia, vol.5: pp.417-425. 15 Nov. 1949. Discusses Seiler's experimental intersexes in Solenobia, which he explains on the same basis as Lymantria intersexes: development is initially ♂ or ♀, but switches to the opposite sex at some stage, the time of the change determining the nature of the intersex. Compare Seiler's explanation (no.128 below). (P.B.)

62. Gough, H.C., "A Note on the Occurrence in Yorkshire of Celaena (= Apamea) secalis L. (Lep., Caradrinidae), Opomyza germinationis L. (Dipt., Opomyzidae) and Crepidodera ferruginea Scop. (Col., Chrysomelidae) in Winter Wheat." Ent. Mon. Mag., vol.83: p.130. May 1947.

63. Graham, Marcus W.R. de V., "Feeding Habits of Papilionidae (Lep.)." Ent. Mon. Mag., vol.83: pp.45-47. Feb. 1947. Notes on flight and feeding of adults of Indian spp. (P.B.)

64. Harper, G.W., "Lepidoptera of West Sussex and East Hampshire, 1946." Ent. Rec. Journ. Var., vol. 59: pp.21-25. March 1947.

65. Harrison, J.W. Heslop, "Early Spring Insects on the Isle of Rhum, with Some Remarks on the Woodland Fauna of the Island." Entomologist, vol.80: pp.1-4. Jan. 1947.

66. Harrison, J.W. Heslop, "Further Observations on the Lepidoptera of the Scottish Western Isles." Entomologist, vol.82: pp.265-268. Dec. 1949.

67. Hemming, Francis, "On the question whether eight generic names in the order Lepidoptera (Class Insecta) commonly accepted as having been first published by Fabricius in 1807 were published by Illiger earlier in the same year." Bull. Zool. Nomencl., vol. 1: pp.260-269. 31 Mar. 1947. Uncertain; to avoid future confusion, proposes that genera involved be placed on Official List: Apatura (type Papilio iris L.); Castnia (P. icarus Cram.); Emesis (Hesperia ovidius Fabr.); Helicopis (P. cupido L.); Neptis (P. aceris Esper); Nymphidium (P. caricae L.); Urania (P. leilus L.). (P.B.)

68. Heqvist, Karl-Johan, "On the Parasites of the Pine Looper-moth (Bupalus piniarius L.)" (In Swedish, summaries in Finnish and English). Ann. Ent. Fennici, suppl.: pp.88-92. 1949.

69. Hinton, H.E., "A New Classification of Insect Pupae." Proc. Zool. Soc. London, vol.116: pp.282-328, 64 figs. Nov. 1946. Classifies pupae as decticous or adecticous, according to whether the mandibles are functional or not. Discusses pupal modifications in the holometabolous orders. (P.B.)

70. Holik, O., "Über die Artberechtigung von Satyrus paupera Alph." (In German). Entom. Zeitschr., vol. 59: pp.70-75, 85-87. 1 Aug., 1 Sept. 1949. S. (recte Minois!) paupera is a good species and not a race of dryas Sc. A detailed discussion of all characteristics, as wing-pattern and ♂ genitalia, is given. Describes as new: ssp. variegata and f. luxurians. (G.dL.)

71. Hoock, Jean, "La parthenogénèse expérimentale chez Antheraea mylitta Drury (Lep. Saturniidae)" (In French). C. R. Acad. Sci., vol.224: pp.501-503. 17 Feb. 1947. Produced by immersing unfertilized eggs in hot Ringer solution, followed by treatment with HCl at time of blastoderm formation. (P.B.)

72. Hovanitz, William, "A Method of Filing Butterflies for the Study of Geographical Variation." Ann. Ent. Soc. Amer., vol.41: pp.48-50, 2 figs. March 1947. Glassine bags useful for filing or for transporting living specimens. (P.B.)

73. Hovanitz, William, "Parallel distribution of gene frequencies in 7 species of Colias butterflies." Anat. Rec., vol.105: pp.608-609. Nov. 1949. Abstract.

74. Io Chou, "The Thirty-two Orders of Insects and Their Chinese Nomenclature. A New System of Classification" (In Chinese, English summary). Ent. Sinica, vol.2: pp.1-7. 1947. Chinese names based on Latin names of certain 'type genera'. Gives a key (in Chinese) to the orders. (P.B.)

75. Jacobs, S.N.A., "Blastobasis phycidella, Zeller (1839) (Lep., Blastobasidae): a Species Hitherto Unrecorded from Great Britain." Ent. Rec. Journ. Var., vol.61: pp.113-114. Nov. 1949.

76. Jaynes, H.A., and P.E. Marucci, "Effect of Artificial Control Practices on the Parasites and Predators of the Codling Moth." Journ. Econ. Ent., vol.40: pp. 9-25. Feb. 1947.

77. Kato, Shizuo, "A Preliminary Report on a Survey of Agricultural Insect Pests in Chahar, Suiyuan and Northern Shansi." Peking Nat. Hist. Bull., vol.18: pp.11-36. Sept. 1949. Gives distribution and food plants of many pest insects, including 33 spp. of Lepidoptera. (P.B.)

78. Kirkpatrick, T.W., "Transport of Insects on the Exterior of an Aircraft." Nature, vol.164: pp.60-61. 9 July 1949. Noctuid eggs laid on wing. (P.B.)

79. Koch, M., "Biston strataria Hufn. mut. melanaria" (In German). Ent. Zeitschr., vol.59: pp.137-139. 15 Dec. 1949. Description of a new melanic form, which is probably a hereditary one. (G.dL.)

80. Kozhantshikov, I.V., "The variability and fertility of Operophtera brumata L. and its environmental conditions" (In Russian, English summary). Isvest. Akad. Nauk SSSR, Ser. Biol., 1947: pp.513-537. Study of variability of wing and leg dimensions and fertility under various conditions; all are maximal under optimal conditions. The ecological and evolutionary significance of brachypterism in the ♀♀ is considered. (P.B.)

81. Landsman, H., "Een nieuwe Lymantride voor Nederland" (In Dutch). Ent. Berichten, vol.12: p.427. 1 Nov. 1949. Laelia coenosa. (P.B.)

82. LaPointe, Marcelle, "Role des facteurs température et humidité relative sur le développement de la Pyrale du mais (Pyrausta nubilalis Hbn.) (1ère partie)" (In French). Ann. de l'Acfas, vol.13: pp.95-96. 1947. Abstract.

83. Larsen, Ellinor Bro, "Activity and Daily Rhythm in Plusia gamma L. (Lep.)" (In Swedish, summaries in Finnish and English). Ann. Ent. Fennici, vol.14, suppl.: pp.154-159, 4 figs. 1949. Effects of light and temperature on activity. (P.B.)

84. de Lattin, G., "Über die Artfrage in der Hipparchia semele L.-Gruppe (Vorläufige Mitteilung)" (In German). Ent. Zeitschr., vol.59: pp.113-118, 124-126, 131-132. 1 Nov. - 1 Dec. 1949. On the basis of genital examination of ♂♂ and ♀♀ it is necessary to divide the "species" semele into the following 6 good species: semele L., mersina Strg., aristaeus Bon., maderensis B.B., pellucida Frhst. and turcmenica Heydem. A short description of the characteristics is given and the described races are distributed to the different species. (G.dL.)

85. Lederer, G., "Ein Beitrag zur Biologie von Celerio hippophaes hippophaes (Esper 1789)" (In German). Entom. Zeitschr., vol.59: pp.65-70, 75-78, 87-88, 100-102. 18 Sept.-1 Oct. 1949. Records of distributions and biology of C. hippophaes and C. nicaea. (G.dL.)
86. Leeds, H.A., "Butterfly collecting in Wood Walton, Hunts., and Royston, Herts., during 1946." Ent. Rec. Journ. Var., vol.59: pp.50-52, 76-79. April, June 1947.
87. Lees, Frank H., "Trigonophora flammea (empyrea) in Devon." Ent. Rec. Journ. Var., vol.59: pp.1-2. Jan. 1947.
88. Lempke, B.J., "Trekvlinders in 1948" (In Dutch, English summary). Ent. Berichten, vol.12: pp.428-433, 447-452, 4 figs. 1 Nov., 1 Dec. 1949. 20 spp. of migrants recorded. (P.B.)
89. Lempke, B.J., "The Variation of Philudoria potatoria, L." Ent. Rec. Journ. Var., vol.62: pp.1-11. Jan. 1950. Describes as new: P. p. occidentalis (Holland); describes briefly 5 other subspecies and 26 'forms', 3 of them new. (P.B.)
90. de Lesse, H., "Contribution à l'étude du genre Erebia (Lepid.). Description des armures génitales femelles" (In French). Rev. franç. Ent., vol.16: pp.165-198, 74 figs. 31 Dec. 1949. General account of ♀ genitalia in Erebia, followed by individual descriptions for 64 of the 69 spp. (P.B.)
91. de Lesse, H., and P. Viette, "Expeditions polaires françaises (Missions Paul-Émile Victor). Campagne 1949 au Groënland. Zoologie. Première note: Microlepidoptera" (In French). Ann. Soc. Ent. France, vol.115: pp.81-92, 14 figs. Dec. 1949. Describes as new Agonopteryx victori (West Greenland). Describes genitalia of both sexes and early stages of 4 other species also. (P.B.)
92. Lever, R.A.J.W., "Insect Pests of Some Economic Crops in Fiji. No.2." Bull. Ent. Res., vol.38: pp. 137-143. 19 May 1947. Lists 77 plants and 10 other materials, with the insects feeding on them, including 23 Lepidoptera. (P.B.)
93. Loritz, Jean, "Eueretagrotis agathina Duponchel ab. cingulata nov. (Lep. Agrotidae)." Entomologist, vol. 80: p.145, 1 fig. June 1947.
94. Lucas, Daniel, "Contribution à la Faune des Lépidoptères de l'Afrique du Nord" (In French). Bull. Soc. Ent. France, vol.54: pp.143-144. Nov. 1949. Describes as new: Stenia bruguieralis "v." mauretanica (Morocco, Tunisia); Teleia leroyella (no locality given); Anarsia durandella (Tunisia); Scythris lemarchandella (Tunisia). No figures, no mention of genitalia, no comparison with other spp. (P.B.)
95. Marsh, J.C.S., "Butterflies of the Hamburg-Lüneberg-Soltau District of Germany." Entomologist, vol.82: pp.223-228. Oct. 1949.
96. Matthes, Ernst, "Weitere Beobachtungen zur Biologie der Psychiden" (In German). Mem. Estud. Mus. Zool. Univ. Coimbra, no.176: 47 pp., 1 pl., 6 figs. 1947. Describes at length the biology of an undetermined sp. of Oreopsyche. (P.B.)
97. Matthes, Ernst, "Zur Fortpflanzungsbiologie eines Schmetterlings (Fumea crassiorella Bruand)" (In German). Mem. Estud. Mus. Zool. Univ. Coimbra, no.182: 41 pp., 1 pl. 1947. Life history; reproductive habits described at length. (P.B.)
98. Matthes, Ernst, "Amicta febretta. Ein Beitrag zur Morphologie und Biologie der Psychiden" (In German). Mem. Estud. Mus. Zool. Univ. Coimbra, no.184: 80 pp., 5 pl., 12 figs. 1947. Comprehensive description of this sp. (P.B.)
99. Millara, Paule, "Contribution à l'étude cytologique et physiologique des leucocytes d'insectes" (In French). Bull. Biol. France Belg., vol.81: pp.129-153, 4 pl. 15 Oct. 1947. 4 spp. of Lepidoptera among those discussed. (P.B.)
100. Mooser, O., "Sphinx pitzahuac n.sp." (In Spanish). Ann. Inst. Biol. Mex., vol.18: pp.547-549, 2 figs. 1947. Describes this species as new. Also redescribes S. libocedrus achotla on the basis of additional material. Both are figured. (P.B.)
101. Moscardini, Carlo, "Osservasioni morfologico-biologiche su Deilephila euphorbiae L." (In Italian). Atti Soc. Nat. Mat. Modena, vol.78: pp.210-212. 1947.
102. Murray, Desmond, "Anaitis plagiata L." Ent. Rec. Journ. Var., vol.61: pp.87-89. Sept. 1949. Biological notes on this geometrid. (P.B.)
103. Naylor, Leonard E., "House building by the bagworm." Country Life, vol.101: pp.330-331, 9 figs. 7 Feb. 1947. Descriptions and figures of larval cases of some Psychidae. (P.B.)
104. Neiswander, C.R., "Variations in the Seasonal History of the European Corn Borer in Ohio." Journ. Econ. Ent., vol.40: pp.407-412, 8 figs. June 1947.
105. Niemierko, W., S.S. Cepelewicz, Z. Kiernik-Zielińska, S. Niemierko, P. Wlodawer, and L. Wojtczak, "A zagadnién fizjologii mola woskowego (Galleria mellonella)" (In Polish). Acta Biol. Experimentalis, vol.15, suppl.: pp.38-41. March 1949.
106. Oiticica Fº, José, and Charles D. Michener, "Genitalic variability in a species of moth of the genus Eacles (Lepidoptera, Saturniidae)." Am. Mus. Novitates, no.1440: 5 pp., 19 figs. 15 Dec. 1949. Describes variation in ♂ genitalia of E. manuelita. (P.B.)
107. Olivier, H.R., "Antibiotic Action of an Extract of Galleria mellonella." Nature, vol.159: p.685. 17 May 1947. Larval extract active against tubercle bacillus. (P.B.)
108. Paclt, Jiří, "On the Gender of the Trivial Names of Two British Butterflies." Entomologist, vol.82: pp.275-276. Dec. 1949. States that correct names are Colias crocea and Ochlodes venatum (names must agree in gender). In a comment by A.C. Townsend it is denied that Ochlodes is necessarily neuter. (P.B.)
109. dos Passos, Cyril F., "Notes on two Incisalia types (Lepidoptera, Lycaenidae)." Can. Ent., vol. 81: pp.180-181. July 1949. Gives the history of the types of Incisalia hadros and I. henrici solatus, and designates lectotypes for each, former in U.S.N.M. and latter in Amer. Mus. Nat. Hist. (C.dP.)
110. Patočka, Jan, "Contributions à la connaissance des Lépidoptères minant dans les environs de Prague" (In Czech). Acta Soc. Ent. Čechosloveniae, vol.44: p.67. 1 June 1947.
111. Petersen, B., "Die regionale und synökologische Gliederung der Schmetterlingsfauna des jämtländischen Gebirges" (In German). Ent. Tidskr., vol.70: pp.184-231. 5 July, 15 Dec. 1949. See abstract in Lep. News, vol.3: p.81, #215. December issue concludes discussion of habitat associations, compares the fauna with that of other regions, deals with the effects of altitude and other biotopical factors, and gives annotated list of spp. (P.B.)
112. Pfaff, G., "Wärmezuchtversuche" (In German). Ent. Zeitschr., vol.59: pp.118-119. 1 Nov. 1949. The author bred many species, especially those of the high mountains, with good success in a heating-box with a temperature of 25-28° C. and a long exposition to the light. The heating-box was composed of a wooden box which was heated by a 15-20 Watt bulb. (G.dL.)
113. de Puységur, K., "Note sur un accouplement entre Zerynthia polyxena-creusa Meig. et Z. rumina-medicaste Ill." (In French). Rev. franc. Lépid., vol.11: pp. 10-15. 23 June 1947.
114. Querci, Orazio, "Notes on Lysandra of the coridon group of species (Lep. Lycaenidae)." Ent. Rec. Journ. Var., vol.59: pp.46-49. April 1947.
115. Querci, Orazio, "The Emergence of a Few Species of Butterflies in Serrania de Cuenca during the year 1928. Ent. Rec. Journ. Var., vol.61: pp.89-91. Sept. 1949.

116. Reiss, H., "Celerio livornica Esp. in Württemberg im Jahre 1946 ein häufiger Schwärmer" (In German). Entom. Zeitschr., vol.59: pp.33-36. 15 June 1949. Report about the unusually numerous occurrence of this southern species in Germany. (G.dL.)

117. Reiss, H., "Bericht des entomologischen Vereins Stuttgart 1896 e.V." (In German). Entom. Zeitschr., vol.59: pp.78-80, 89-91, 102-104, 109-112, 119-120. 15 Aug.- 1 Nov. 1949. Many new records of the lepidopterous fauna of Württemberg. (G.dL.)

118. Ritcher, P.O., "European Corn Borer in Kentucky." Kentucky Agr. Exp. Sta. Bull., no.502: 23 pp., 18 figs. May 1947.

119. Riley, N.D., "The Rothschild-Cockayne-Kettlewell Collection of British Lepidoptera." Entomologist, vol.83: pp.19-20. Jan. 1950. Accessions. (P.B.)

120. Roepke, W., "Nomenclatorische aantekeningen II" (In Dutch). Ent. Berichten, vol.12: pp.413-417. 1 Sept. 1949. Discusses Lymantria and other questions of nomenclature. (P.B.)

121. Rogsch, O., "Fang eines Zwitters von Aglia tau" (In German). Entom. Zeitschr., vol.59: pp.95-96, 1 fig. 15 Sept. 1949. Description and figure of a gynander of A. tau. (G.dL.)

122. Russell, S.G. Castle, "The Oviposition of the Satyrid Pararge megera L." Ent. Rec. Journ. Var., vol. 61: p.87. Sept. 1949.

123. Sanborn, Richard C., and Carroll M. Williams, "Unusual properties of the succinoxidase system in the Cecropia silkworm." Anat. Rec., vol.105: pp.512-513. Nov. 1949. Abstract only. (P.B.)

124. Schmidt, Edward L., and Carroll M. Williams, "Assay for the growth and differentiation hormone of Lepidoptera by the method of tissue culture." Anat. Rec., vol.105: p.487. Nov. 1949. Abstract. (P.B.)

125. Schultz, V.G.M., "Neue Beiträge zur Schmetterlingskunde. Nr.7. Über die ökologischen Ansprüche Noctuidenart Gordyna ochracea Hb. und die Aufzucht ihrer Raupe." Ent. Zeitschr., vol.59: pp.126-128. 15 Nov. 1949. (In German). Records of the food-plants and the breeding methods of the larva of this species. (G.dL.)

126. Schwarz, R., "Contribution à la Lépidoptèrologie de la Tchécoslovaquie". (In Czech, French summary). Acta Soc. Ent. Čechosloveniae, vol.44: pp.67-70. 1 June 1947. Records 8 spp. and 'forms' new to the country. Synonymizes Chamaesphecia stelidiformis f. icteropus under C. palustris. (P.B.)

127. Seiler, J., "Bemerkungen zu Goldschmidt's Interpretation der Intersexen Solenobien" (In German). Arch. Julius Klaus-Stiftung, vol.21: pp.273-275. 15 Feb. 1947.

128. Seiler, J., "Das Intersexualitatsphänomen" (In German). Experientia, vol.5: pp.425-438, 8 figs. 15 Nov. 1949. Summarizes his experiments on Solenobia and gives his explanation of intersex development. Assumes that the ♂ and ♀ determiners in these triploid intersexes are completely balanced; degree of intersexuality is determined very early, by environmental influences, and there is no change from ♂ to ♀ during development. Compare Goldschmidt's explanation (no. 61, above). (P.B.)

129. Sevastopulo, D.G., "Tukdah Diary, September-November 1945." Ent. Rec. Journ. Var., vol.59: pp.4-7, 32-34, 56-58, 91-94. Jan.,March, May, July-Aug.1947. Records of Indian Lepidoptera. (P.B.)

130. Sevastopulo, D.G., "Field Notes from East Africa (2)." Entomologist, vol.82: pp.205-207. Sept. 1949. On the biology of several spp. of Lepidoptera. (P.B.)

131. Sevastopulo, D.G., "Field Notes from East Africa (3)." Entomologist, vol.83: pp.10-13. Jan. 1950.

132. Shaw, J.G., "Parasites of a Bag-Making Pierid, Eucheira socialis in Morelos, Mexico." Journ. Econ. Ent., vol.40: pp.436-437. June 1947.

133. da Silva Cruz, Maria Amélia, and Timóteo Gonçalves, "Notas Lepidopterologicas. II. Parnassius apollo L. em Portugal" (In Portuguese). Mem. Estud. Mus. Zool. Univ. Coimbra, no.178: 10 pp., 2 figs. 1947. Notes on range, variation, and habits; description and figures of a specimen of extreme size. (P.B.)

134. Simmonds, F.J., "The Biology of the Parasites of Loxostege sticticalis, L., in North America - Braçon vulgaris (Cress.) (Braconidae, Agathinae)." Bull. Ent. Res., vol.38: pp.145-155, 8 figs. 19 May 1947.

135. Smelhaus, Jiří, "Polyommatus meleager Esp. x P. coridon Poda (Lep. Lyc.). Note préliminaire" (In Czech, French summary). Acta Soc. Ent. Čechosloveniae, vol. 44: pp.44-47, 3 figs. 1 June 1947. Records 3 ♂ hybrids. Figures hybrid and both spp. (P.B.)

136. Sokolov, G.N., "Evolution of the wing-pattern in the Lasiocampid moths" (In Russian, English summary). Isvest. Akad. Nauk SSSR, Ser. Biol., 1947: pp.79-86, 2 pl.

137. Sokotowski, Jan, "Butterflies (Rhopalocera) in the mountainous region of Zagnansk (Gory Swietokrzyskie)." (In Polish, Engl. abstract). Poznan Soc. Friends Sci., Dept. Math. Nat. Sci., Biol. Sect., vol.12: pp. 123-135. 1949. Describes climate and physical features; gives an annotated list of 60 spp. (P.B.)

138. Solodovnikov, V.B., "Izmenenie povedeniia gusenits kitaiskogo du'ovogo shelkopriada (Antheraea pernyi) na kormovom gradiente" [Modification of behavior in larvae of Chinese silkworm by feeding gradients] (In Russian). Doklady Akad. Nauk SSSR, vol.60: pp.321-324. 1948.

139. Stelfox, A.W., "Methods of Indicating Distribution, with Special Reference to that of the Dingy Skipper in Ireland." Irish Naturalists Journ., vol.9: pp. 281-283. July 1949.

140. Stempffer, H., "Description d'un Lycénide nouveau de Madagascar" (In French). Rev. franç. Ent., vol. 14: pp.139-140, 1 fig. 30 June 1947. Describes as new Euchrysops decaryi (Madagascar). Male genitalia figured. (P.B.)

141. Stempffer, H., "Contribution à l'étude des Lycaenidae de la faune éthiopienne" (In French). Ann. Soc. Ent. France, vol.114: pp.77-84, 12 figs. Dec. 1949. Notes on 15 of Aurivillius's type specimens, with descriptions of male genitalia. Regards Cupido loveni as a synonym of C. parsimon. (P.B.)

142. Stockley, C.H., "Lower Tana Collection of Butterflies 1948." Nature in E. Africa, ser.2, no.1: pp. 7-8. May 1949.

143. Stone, Ruth and Philip, "Collecting Imperial and Luna Moth Larvae." Turtox News, vol.28: p.38. Jan. 1950. Found on beach by fecal pellets under trees. (C.R.)

144. Stroyan, H.L.G., "Range Changes in British Butterflies." Entomologist, vol.82: pp.210-211. Sept. 1949. Discusses Lysandra bellargus and Pararge aegeria. (P.B.)

145. Sussman, Alfred S., "The Functions of Tyrosinase in Insects." Quart. Rev. Biol., vol.24: pp.328-341. Dec. 1949. Review, covering the distribution and function of this enzyme, which is important in the formation of cuticle and of melanin pigments. (P.B.)

146. Suter, M., "A remarkable aberration of a Papilio polytes romulus Cram." Journ. Bombay Nat. Hist. Soc., vol.48: pp.607-608, 1 fig. Aug. 1949.

147. Sylvén, Edvard, "Systematic Studies of the Swedish Species of Pyralinae, Nymphulinae and Pyraustinae (Pyr.,Lep.)." Arkiv för Zoologi, vol.38A,no.13: 37 pp.,131 figs. 21 Jan.1947. Discusses the history of classification of the groups; describes the basis of his classification (mainly genitalia, venation and palpal structure) and its application in all cases. There is a synopsis of subfamilies and genera, with keys and descriptions of each category, and a list of spp. The general section is supported by many figures of key characters. (P.B.)

148. Talbot, G., "A Little-known Method for Preserving Larvae of Lepidoptera and other Insects in the Dry State." Ent. Mon. Mag., vol.83: p.152. June 1947. Involves fixing in Ble's solution and clearing in xylene. (P.B.)

149. de la Torre y Callejas, Salvador Luis, "Estudio de las subespecies cubanas de Ascia monuste. (Lepidoptera: Pieridae)" (In Spanish). Mem. Soc. Cubana Hist. Nat., vol.19: pp.171-175, 1 pl. 25 Nov. 1949. Records races nomuste, phileta, and eubotea, the first two being new records for Cuba. Describes and figures all three. (P.B.)

150. de la Torre y Callejas, Salvador Luis," Datos taxonomicos sobre Lepidopteros, con notas sobre algunas especies cubanas" (In Spanish). Mem. Soc. Cubana Hist. Nat., vol.19: pp.177-190. 25 Nov. 1949. Notes on the correct identification and nomenclature of 21 Cuban genera and species. (P.B.)

151. de la Torre y Callejas, Salvador Luis, "Generos y especies de la subfamilia Heliconiinae hallados en Cuba (Lepidoptera: Nymphalidae)" (In Spanish). Mem. Soc. Cubana Hist. Nat., vol.19: pp.191-194. 25 Nov. 1949. Key to the four Cuban genera; records Cuban forms and their distributions. (P.B.)

152. de la Torre y Callejas, Salvador Luis, "Sobre la presencia en Cuba de Papilio (Pterourus) troilus ilioneus James E. Smith" (In Spanish). Mem. Soc. Cubana Hist. Nat., vol.19: pp.195-196. 25 Nov. 1949. Describes P. troilus and its habits in the U.S.; distinguishes between the two subssp., and records ilioneus from Cuba. (P.B.)

153. Tozer, G., "Lepidoptera of Midland and Eastern District, 1946." Ent. Rec. Journ. Var., vol.59: pp. 9-12. Feb. 1947.

154. Trager, William, "Insect Nutrition." Biol. Revs., vol.22: pp.148-177. April 1947. Review article. Covers vitamin, salt, carbohydrate, fat, and protein growth, reproduction and adult form, and food selection and preferences. Most work on the Lepidoptera has been done on Ephestia and Galleria, but a number of other species are mentioned. (P.B.)

155. Turner, A.H., "Effects of the Severe Weather at Taunton, with the Normal Similar Period 1946." Ent. Rec. Journ. Var., vol.59: pp.65-66. June 1947.

156. Valletta, Anthony, "Additions to the List of Lepidoptera Heterocera of the Maltese Islands." Entomologist, vol.82: pp.208-209. Sept. 1949. 12 species listed. (P.B.)

157. Viette, P., "Hépialidès de l'Afrique orientale" (In French). Rev. franç. Ent., vol.14: pp.19-24, 8 figs. 30 April 1947. Describes and figures the genitalia of 6 spp. (P.B.)

158. Viette, P.,"Révision du catalogue des Lépidoptères Homoneures. 1^re Note: Famille des Micropterygidae" (In French). Rev. franç. Ent., vol.14: pp.24-31, 6 figs. 30 April 1947. Keys to superfamilies of Homoneura, (4) families of Microptergoidea, and (7) genera of Micropterygidae (figures venation of 6); lists all spp. of family, with locality and reference to original description. A valuable paper. (P.B.)

159. Viette, P., "Une petite collection de Lépidoptères Hétérocères des Îles Mariannes et Fiji" (In French). Bull. Soc. Ent. France, vol.54: pp.135-136. Nov. 1949. Lists spp.;mostly noctuids and pyralids. (P.B.)

160. Viette, P.,"Contribution à l'étude des Hepialidae (11^e Note). Sur quelques espèces sud-américaines" (In French). Ann. Soc. Ent. France, vol.116: pp.73-81, 8 figs. Dec.1949. Describes as new: subgenus PARANA (type Aepytus philiponi n.sp.,Brazil); A.(Hampsoniella) equatorialis (Ecuador); A.(Pseudolaca) gugelmanni (Mexico); SCHAUSIANA (type Phassus trojesa). Describes ♂ genitalia of 4 other spp. of Aepytus. (P.B.)

161. Vlach, Vilém, "Bembecia pectinata Stgr. (Aeger.-Lépidopt.) vit aussi dans l'Europe centrale" (In Czech, French summary). Acta Soc. Ent. Čechoslovenіae, vol.44: pp.71-72. 1 June 1947.

162. Warnecke, G., "Über Wanderfalter in Mitteleuropa 1946." (In German). Entom. Zeitschr., vol.59: pp. 30-32. 15 May 1949. Observations of the occurrence of migrating Lepidoptera in Germany and neighboring countries. (G.dL.)

163. Warnecke, G., "Die Verbreitung der drei Arctiiden (Lep.) Orodemnias cervini Fallou, Orodemnias quenselii Payk. und Arctia flavia Fuessl. besonders in den Alpen und ihre Einwanderungsgeschichte" (In German). Entom. Zeitschr., vol.59: pp.57-63, 82-85, 92-95, 97-101, 107-109. 15 July-15 Oct. 1949. A very detailed description of the chronology and history of geographical distribution of the three species. (G.dL.)

164. Weaver, C.R., "Some Aspects of the Distribution of Larval Parasites of the Oriental Fruit Moth in Ohio." Ohio J. Sci., vol.19: pp.154-159, 1 fig. July 1949. Records 37 spp. of hymenopterous parasites bred from Grapholitha molesta in Ohio, and discusses distribution of the commonest forms. (P.B.)

165. Wightman, A.J., "Noctuae Notes in 1946." Ent. Rec. Journ. Var., vol.59: pp.12-14. Feb. 1947.

166. Wightman, A.J., "Variation of Eremobia ochroleuca." Ent. Rec. Journ. Var., vol.59: p.27. Mar. 1947.

167. Williams, Carroll M., "The prothoracic glands of insects in retrospect and in prospect." Biol. Bull., vol.97: pp.111-114, 2 figs. Aug. 1949. Reproduces Lyonet's (1762) original description and figures of prothoracic glands in caterpillars. Discusses briefly current evidence on distribution of these glands in various insect orders. (P.B.)

168. Wiltshire, E.P., "Addendum to Some More New Records of Lepidoptera from Cyprus, Iraq, and Iran." Ent. Rec. Journ. Var., vol.61: p.97. Oct. 1949.

169. Wishart, Geo., "Further Observations on the Changes Taking Place in the Corn Borer Population in Western Ontario." Can. Ent., vol.79: pp.81-83. May 1947. Reports increase of multivoltine strain. (P.B.)

170. Wittstadt, H.,"Uber die Lokalrassen des Parnassius apollo im nördlichen Bayern" (In German). Entom. Zeitschr., vol.59: pp.21-25. 15 May 1949. A detailed description of the Franconian P. apollo, which correct name is ssp. melliculus Stich. The names lithographicus, ancile, franconicus, and bajuvaricus are only synonyms. (G.dL.)

171. Wittstadt, H., "Pericallia matronula Hb. in Nordbayern" (In German). Ent. Zeitschr., vol.59: pp. 121-124. 15 Nov. 1949. Records of the occurrence of P. matronula near Regensburg (Bavaria). (G.dL.)

172. de Worms, C.G.M., "British Lepidoptera Collecting, 1946." Entomologist, vol.80: pp.8-13, 80-83. Jan.,Feb. 1947.

173. de Worms, C.G.M., "A Short Collecting Trip in the Pyrenees, June 1949." Ent. Rec. Journ. Var., vol.62: pp.13-14. Feb. 1950.

174. Wynter-Blyth, M.A., "Additions to 'The list of butterflies of the Simla Hills' published in Vol. XLI, no.4." Journ. Bombay Nat. Hist. Soc., vol.46: pp.735-736. April 1947.

175. Wynter-Blyth, M.A., "Note on the Butterfly Valeria valeria hippia (Fabricius) ♀ form philomela." Journ. Bombay Nat. Hist. Soc., vol.46: pp.736-737. April 1947.

Erratum: Vol.3: p.70: no.176 — Volume number should have been "31".

NOTICES BY MEMBERS

All members may use this column to advertise their offerings and needs in Lepidoptera. There is no cost for this service. Unless withdrawn sooner by the member, each notice will appear in THREE issues.

Wish to exchange JAPANESE LEPIDOPTERA for those of the U.S.A. Have such things as Sasakia c. charonda, Luehdorfia japonica Leech, etc. Hideaki Ogasawara, No. 284, Sugano, Ichikawa, Chiba Pref., JAPAN.

ARIZONA SPECIES NEEDED? Planning collecting trip this summer; will collect on order all families of Lepid. Prepared as desired: alive, pinned, papered.

* * *

Can also supply many southwestern species of Lepidoptera,(Rhopalocera, Heterocera),papered or pinned. Also LIVING MATERIAL. Inquiry invited. Frank P. Sala, 1764 Colorado Blvd., Los Angeles 41, Calif.

For sale: 4000 Unit Pinning Trays, balsa pinning bottom, white paper lined throughout, heavy caliber cardboard. Slightly defective. Standard sizes for Cornell or California Drawers. $1.00/dz. Free sample on request. Cornell and California Academy drawers now available with cabinets. Bio Metal Associates, P.O. Box 346, Beverly Hills, Calif.

Wish to exchange about 200 MANITOBA MOTHS, about 50 species, half named, full data. Desire exotic Rhopalocera, particularly Morpho. What offers for the lot? C.S. Quelch, Transcona, Manitoba, CANADA.

Lepidoptera from Florida and Wisconsin, a lot of over 2000 specimens, about 300 species, pinned and in papers. Want to sell the lot at bargain price. Send for list. Alex K. Wyatt, 5842 N. Kirby Ave., Chicago 30, Illinois.

For exchange: Northwestern Washington moths and butterflies collected last season. Desire Australian or any tropical Lepidoptera. Mrs. Emily Henriksen, Orcas Island, East Sound, Washington.

For sale: Japanese Papilionidae, Pieridae, Nymphalidae, and Sphingidae with all correct data supplied. Listings sent on request.
M.W. Osborne, 2100 Price St., Rahway, New Jersey.

Wanted: Papered specimens of Pieris napi, Pieris bryoniae, and Papilio machaon from all parts of the world, particularly from American and Asiatic localities, with full data and in perfect condition. Offered in exchange: Papered Macro-lepidoptera from GERMANY, and, if possible, breeding material. Gerhard Hesselbarth, Hindenburgstr. 13, (23) Diepholz/Hann., GERMANY.

European Parnassiidae in papers (named, full data, perfect condition) for sale or in exchange for North American Papilionidae and Parnassiidae in papers. Dr. W.J. Reinthal, University of Okla.,Norman, Okla.

Will exchange good used copy of Holland's MOTH BOOK for copy of revised ed. of BUTTERFLY BOOK in good used condition. L.H. Bridwell, Forestburg, Texas.

For exchange: The Spider Book, revised ed. Comstock; Hand Book of Frogs and Toads, Wright and Wright; The Grasshopper Book, Bronson; also Pennsylvania fossils. Desire Speyeria diana ♀♀ or Papilio ponceana ♀ or ♂ with data. J.A. Evey, Benson, Illinois.

LIVING MATERIAL

Wish to arrange to obtain living ova, pupae, or cocoons of American Rhopalocera, Saturniidae, Sphingidae, Catocala. Offer in exchange similar material from CZECHOSLOVAKIA, including Saturnia pyri, Thais polyxena, etc. in season, or papered butterflies. V.B. Poláček, ul. Komenského, 601-I., Brandýs nad Labem, CZECHOSLOVAKIA.

Would like to correspond in English or German with collectors interested in exchanging living Lepidoptera material — eggs and pupae. Johannes Reichel, Koenigsberg Krs. Wetzlar (16), GERMANY.

New northern subspecies Eacles imperialis pini for sale, either HIBERNATING PUPAE or male adults. Price of pupae or specimens: 3 for $1.00, postpaid. Elwyn Lewis, 384 E. Warren St., Flint, Michigan.

Have cocoons of wild Connecticut SAMIA WALKERI ("Cynthia") to exchange for those of other Saturniidae. R.W. Pease, 57 Yale Station, New Haven 11, Conn.

Wanted to buy: rearing material in season — cocoons, pupae or eggs of Rhopalocera, Saturnioidea, Sphingidae, Arctiidae and Catocala. Write first quoting prices and naming food plants. Have Austrian pins for sale, best make (Trade Mark "Elephant"), rustproof, $4.00 per thousand. Eugene Dluhy, 3912 N. Hamilton Ave., Chicago 18, Illinois.

Available now: GRAELLSIA ISABELLAE (Spanish luna) and other Palearctic fauna pupae. Otto H. Schroeter, 613 Williams St., New London, Conn.

Wanted: chrysalids of any North American PAPILIO in exchange for good European butterflies of Parnassiidae in papers (full data, exact names). Dr. W.J. Reinthal, Univ. of Oklahoma, Norman, Oklahoma.

Cocoons or eggs of all species of American Saturniidae required. Will exchange living or preserved material of BRITISH LEPIDOPTERA and/or INDIAN SATURNIIDAE. Also willing to obtain books or other requirements of American supplier. Currency restrictions prevent cash transactions! Please help if you can. C.F. Rivers, 250 Shepherds Lane, Dartford, Kent, ENGLAND.

Wanted for cash or exchange: living ova or pupae of Papilio machaon (Palaearctic), P. glaucus, Platysamia columbia nokomis, for hybridization and sterility experiments. Also need egg masses of Catocala relicta, and 200 living cocoons of Platysamia cecropia. D.P. Frechin, 1504 N. Lafayette, Bremerton, Wash.

Eupackardia (Callosamia) calleta cocoons for exchange. Desire pupae Callosamia angulifera and Asiatic, African and South American Saturniidae. R.L. Halbert, 2446 Cudahy St., Huntington Park, Calif.

ADDITIONS TO THE MEMBERSHIP LIST

Blat, Francisco, Calle Consulado del Mar 3, Barcelona, SPAIN.
Brower, Lincoln P., P.O. Box 111, Madison, N.J.
Dluhy, Eugene, 3912 N. Hamilton Ave.,Chicago 18, Ill.
Ebert, Heinz (Dr.), Bayreuthstrasse 65, Hof/Saale, GERMANY.
Harris, Lucien, III, 1005 Buckingham Circle N.W., Atlanta, Georgia.
Hospital, Domingo, Calle Angli 53, Barcelona, SPAIN.
Iwase, Tarō, 345 Komachi Kamakura, Kanagawa-ken, JAPAN.
Lewis, Elwyn, 384 E. Warren St., Flint 5, Michigan.
de Luque, Antonio Varea, Calle de Ibiza 13, Madrid, SPAIN.
*Macheboeuf, Charles, Kelseyville, Calif.
Mills, Kenneth R., 3636 Western Ave., Alton, Ill.
Naumann, Fred T., 17 Beekman Terr., Summit, N.J.
Penny, Robert H., 20 Bound Brook Rd., Newton Highlands 61, Mass.
Reichart, George B., 5580 Estates Drive, Oakland 18, Calif.
Reichel, Johannes, Koenigsberg Krs. Wetzlar (16), GERMANY.
Sala, Frank, 1764 Colorado Blvd., Los Angeles 41, California.
Samuelson, G.Allan, 3824 Walnut Ave.,Concord, Calif.
Smith, Vick.T.H., 20 Southway, Yallourn, Victoria, AUSTRALIA.
Thrasher, William, R.D. Route 2, Garrettsville, Ohio.
Was, Howard E., 3415 N. Third St.,Milwaukee 12, Wis.
*Wygodzinsky, Petr W. (Dr.), Instituto de Medicina Regional, Calle Buenos Aires 769, Tucumán,ARGENTINA.

* These two were 1949 members.

CHANGES OF ADDRESS

Albrecht, Paul, 116 Wilhelmstr., (1) Berlin-Rummelsburg, GERMANY.
Azuma, Masao (Prof.), 27/0 Kamiyoshihara-machi, Nishinomiya, Hyogo Pref., JAPAN.
Bailey, Earl G., Tecumseh St., General Delivery, St. Catharines, Ont., CANADA.
Beirne, B.P. (Dr.), Div. of Entomology, Dept.of Agriculture, Central Exper. Farm, Ottawa, Ont., CAN.
Cobb, M.G., 942 W. 34th St., Los Angeles 7, Calif.
Gozmány, L.A. (Dr.), Szèll Kàlman tér. 13, Budapest, XII, HUNGARY.
Halbert, R.L., 2446 Cudahy St., Huntington Park,Cal.
Holley, F.E., 126 Ash St., Lombard,Ill.
King, H.L., Box 1171, Sarasota, Fla.
Kolyer, J.M., 38 Hill Lane, Roslyn Heights, N.Y.
Mather, Bryant, P.O. Drawer 2131, Jackson, Miss.
Mueller, Joseph, 16 Exeter Rd., Short Hills, N.J.
Munroe, E.G.(Dr.), Div. of Entomology, Dept. of Agriculture, Central Exper. Farm, Ottawa, Ont., CAN.
Schryver, C.D., 4426 Vrain St., Denver 12, Colo.
Smith, Arthur C., Dept. of Entomology, Cornell University, Ithaca, N.Y.
Straatman, Raymond, Ond. Mata Pao, p/o Sei Rampah, East Coast of Sumatra, INDONESIA.
Vogel, H.A., 12040 Duchess, Detroit 24, Mich.

DECEASED

Minot, George R. (Dr.) Massachusetts.
Zikán, W. Brazil.

TABLE OF CONTENTS

BACK ISSUES OF THE NEWS AVAILABLE

The stocks of back issues have become greatly reduced, but copies are available as follows:

Vol.1, lacking from 5 to 33 pp. (according to order of purchase) -- $1.50
Vol.2, lacking pp.13-14, 17-24 -- $2.00
Vol.3, complete including List of Members -- $2.00
Separates of Recent Literature pages for clipping and filing, complete for Vol.3 -- $0.50

MAILING DATE
for
Vol.3: no.8-9
23 March 1950

THE LEPIDOPTERISTS' NEWS
Monthly periodical of The Lepidopterists' Society

Membership is open to all persons interested in any aspect of the study of butterflies and moths. The 1950 dues, including subscription to the NEWS, are $2.00 for Regular Membership and $4.00 for Sustaining Membership. Please make remittances payable to: C.L. Remington.

The Lepidopterists' News

THE MONTHLY PERIODICAL OF THE LEPIDOPTERISTS' SOCIETY
c/o Osborn Zoological Laboratory, Yale University, New Haven 11, Connecticut, U.S.A.
Editor - C. L. REMINGTON • *Assoc. Editor* - J. E. REMINGTON
Volume IV 1950 Number 3

SOME ORIGINAL PAINTINGS BY JOHN ABBOT*

by Bryan P. Beirne

The discovery of 38 apparently unpublished original water-color paintings of life-histories of Lepidoptera by John Abbot is of some interest. The paintings are bound in a folio volume that was advertised for sale by a bookseller in Bristol, England, some years before the Second World War and that was bought by Mr. Seumas O'Sullivan, of Dublin, Ireland, from whom I obtained it in 1943. In that year I sent it to Mr. T. Bainbrigge Fletcher, who identified the paintings as the work of Abbot and suggested that he retain the volume for safekeeping during the War. At the end of the War Mr. Fletcher became seriously ill and was unable to receive or answer letters. In 1949 his library was dispersed and the volume came into the possession of Mr. Eric W. Classey, natural history bookseller of Feltham, Middlesex, England, who kindly returned it to me.

The volume is bound in soft leather, dark maroon in color, with gilt lines near the margins of the covers and on the spine, and with gilt-edged pages. It measures 10 by 13 inches. The fly-leaves are black. There are four blank leaves at the front and two at the back. These are of different paper from that of the leaves with the paintings. The 38 paintings are on stiff white paper with the watermark "1794 J. Whatman". The volume is not titled, nor are the paintings signed. It is in good condition and the paintings are clean and unmarked except for the inscriptions described below.

Some pages bear numbers in ink on the top left-hand corners; in others these numbers have been mutilated, presumably when the leaves were trimmed by the binders. The numbers are absent from most of the leaves. Some leaves had inscriptions in pencil at the bottom, but these have been trimmed off almost completely and it is impossible to make them out. Inside the cover is a bookseller's sticker: "William George's Sons Ltd. Booksellers. 89 Park Street, Bristol". The paintings are numbered lightly in pencil from 1 to 38 on the bottom right-hand corners. Some have the letter "A" written in pencil on the back. No.38 has the words "orange footman" in pencil under the painting. This is the common name of a British Lithosiid moth that resembles in size and color the Hesperiid butterfly of the figure. It may indicate that the volume had been owned by somebody with a slight knowledge of the British Lepidoptera.

There can be no doubt that the paintings are by Abbot. Some of the species depicted are also figured in James E. Smith's The Natural History of the rarer Lepidopterous Insects of Georgia (1797); but in all instances different paintings are reproduced in that work, different food plants often being shown, and sometimes different color-forms of the larvae. The original paintings are much superior to the reproductions. The coloring, both of the insects and plants, is far more accurate and life-like, and often greater detail is shown. Two of the species are also figured in Boisduval and Leconte's Histoire des Lépidoptères d'Amérique (1833) from paintings by Abbot, but the reproductions are of different figures.

The following is a brief description of the paintings. I am indebted to Dr. Eugene Munroe and to Mr. D.F. Hardwick, Division of Entomology, Ottawa, for identifying the Lepidoptera and to Dr. H.A. Senn, Division of Botany and Plant Pathology, Ottawa, for identifying the plants. In each instance a flowering or fruiting branch of the food plant is shown.

1. Paonias astylus Dru.; larva on Kalmia latifolia; pupa.

2. Numbered 211+. Phoebis sennae eubule L., ♂, ♀, and an underside; larva on Cassia (Chamaecrista) sp., probably C. nictitans; pupa on stem of food plant. This species is figured by Smith, Tab.V, but on a different food plant. In the original the specimen showing the underside is resting on the food plant with its wings folded.

3. Prodenia sp. resembling praefica Grote, ♂ and ♀; larva on Sabatia gracilis; pupa.

4. Numbered 60+. Xanthotype urticaria Swett or one of the related species, ♂ and ♀; larva feeding on Salix sp.; pupa.

5. Lerema accius J.E.Sm. (?), ♂, ♀, and an underside; larva feeding on a grass, Paspalum or Panicum sp.; pupa. This species is figured by Smith, Tab. XXIII, but on a different food plant and the male without the sex marking on the forewing which is

*Contribution No.2672, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Canada.

distinct in the original painting. In the original the specimen showing the underside is in the resting position on the food plant.

6. Erynnis brizo Boisd., ♂, ♀, and an underside; larva feeding on possibly Tephrosia or Indigophera sp.; pupa. This species is figured by Boisduval and Leconte, Pl.66, but on a different food plant.

7. An unidentified noctuid; larva on Pinguicula lutea; pupa.

8. Numbered 223+ or 225+. Ectropis crepuscularia Dup., ♂ and ♀; larva feeding on Lupinus sp.; pupa.

9. Halisidota tessellaris J.E.Sm., ♂ and ♀; larva feeding on Carpinus caroliniana; pupa. This species is figured by Smith, Tab.LXXV, but on a different food plant and with the cocoon.

10. Megalopyge or Lagoa sp., ♂ and ♀; larva on Nyssa sylvatica; pupa.

11. ♂ possibly Protoboarmia porcelaria Gn., ♀ possibly a related species; larva on Verbena sp., possibly V. canadensis; pupa.

12. Numbered 151+. Pyrausta futilalis Led., ♂ and ♀; larva on Apocynum androsaemifolium; pupa.

13. Besma quercivoraria Gn., ♂ and ♀; larva feeding on Quercus sp., possibly Q. phellos; pupa.

14. Safia anella Gn.; larva feeding on Quercus borealis; pupa.

15. Heterocampa sp., possibly guttivitta Walk.; larva on Pinchneya pubens; pupa.

16. Euchlea delphinii Boisd., ♂ and ♀; larva on Cornus florida; pupa; cocoon.

17. Numbered 221+. Cosymbia sp., possibly packardi Prout, ♂ and ♀; larva on possibly Bidens sp.; pupa on stem of food plant.

18. Heterocampa sp., ♂ and ♀; larva on Quamoclis coccinea; pupa.

19. Acronycta sp., possibly americana Harr.; larva on Dasystoma pectinata (?); pupa.

20. Phobetron pithecium J.E.Sm., ♀; larva feeding on Ilex sp., possibly I. cassine; pupa. This species is figured by Smith, Tab.LXXIV, but on a different food plant, with an imaginary male and with the cocoon.

21. Anicla infecta Ochs., ♂ and ♀; larva feeding on Gentiana sp.; pupa.

22. Numbered 149+. Abagrotis alternata Grote, ♂ and ♀; larva feeding on Rhus copallina; pupa.

23. Numbered 220+. Prodenia eridania Cram., ♂ and ♀; larva feeding on a composite, possibly Petasites sp.; pupa.

24. Ethmia sp., possibly fuscipedella Wals.; larva feeding on Pentstemon sp.; pupa.

25. Numbered 133+(?). Leucania unipuncta Haw.; larva on Senecio sp.; pupa.

26. Heterocampa sp. close to astarte Dbl., ♂ and ♀; larva feeding on Quercus sp.; pupa.

27. Thorybes bathyllus J.E.Sm., ♂, ♀, and an underside; larva feeding on Crotalaria sp.; pupa. This species is figured by Smith, Tab.XXII, but in the original the specimen showing the underside is in a resting position on the food plant. Boisduval and Leconte also figure the species, but on a different food plant.

28. Hemerocampa leucostigma J.E.Sm., ♂ and ♀; larva feeding on Halesia sp.; ♂ and ♀ pupa. This species is figured by Smith, Tab.LXXIX, but on a different food plant.

29. Heliothis virescens Fab., ♂ and ♀; larva feeding on Rhexia sp., probably R. mariana; pupa. This species is figured by Smith, Tab.C., but with a differently colored larva.

30. Numbered 184+. Apatelodes angelica Grote; larva feeding on Fraxinus sp.; pupa.

31. Olene leucophaea J.E.Sm., ♂ and ♀; larva feeding on a species of Euphorbiaceae, possibly Croton sp.; pupa. This species is figured by Smith, Tab. LXXVIII, but on a different food plant.

32. Numbered 85+. Amblyscirtes samoset Scudder, ♂, ♀, and an underside; larva on Sorghastrum sp.; pupa.

33. Schizura unicornis J.E.Sm., ♂ and ♀; larva feeding on Aronia sp., possibly A. arbutifolia; pupa. This species is figured by Smith, Tab. LXXXVI.

34. Apantesis phyllira Dru. (?), ♂ and ♀; larva on Oenothera sp.; pupa.

35. Feniseca tarquinius Fab., ♂ and ♀, and an underside; larva feeding on Viburnum dentatum; pupa on stem of food plant.

36. Ceratomia undulosa Walk.; larva feeding on Fraxinus sp.; pupa.

37. An unidentified species (a small, dark, bronzy-green moth with orange-tipped abdomen), ♂ and ♀; larva feeding on Spigelia marilandica; pupa.

38. Atrytone arogos Boisd. and Lec., ♂ and ♀, and an underside; larva feeding on Panicum sp.; pupa.

[Ed. Note: Previous articles in the Lep. News on John Abbot, including his autobiography, have appeared as follows: vol.2: pp.28-30, 43, 108; 1948. C.L.R.]

LEPIDOPTERA OF THE PRIBILOF ISLANDS, ALASKA

by Edward C. Johnston
Seattle, Washington

The Pribilof Islands are situated in the Bering Sea 200 miles northwest of Dutch Harbor. The nearest point on the mainland is 300 miles or more distant. It is to these islands that the great Alaska Fur-seal herd comes each summer for breeding purposes and to rear their young. Only two of the five islands in the group, St. Paul and St. George, are suitable for occupation by man. Forty miles of open sea, safe for ocean going vessels only, separate them. Usually, when the Bering Sea is mentioned, people immediately picture ice fields and barren, windswept terrain away up towards the North Pole. The Pribilof Islands, however, lie in 57 degrees North latitude, which is approximately the same as that of Petersburg in southeastern Alaska. A branch of the Japanese current helps to keep the climate mild but causes foggy and overcast conditions during the summer months. During the month of July the temperature ranges between 48° and 40° F. and the sun is seldom seen. It is a curious fact that I have been out when the sun was not in sight all day and sunburned enough to peel. Winter temperatures are comparable to those in Nebraska and only occasionally drop below zero. Rainfall is light, but heavy dews and mists help to maintain numerous boggy lakes. There are no running streams.

TOPOGRAPHY

Of the two islands St. George is the more rugged. It is roughly triangular with a maximum length of 12 miles and a width of 4 1/2 miles. The uplands are either rocky or, in a few localities, composed of disintegrating scoria, a red or black volcanic cinder. With the exception of three slight indentations of the beach line the island is surrounded by vertical rocky cliffs 300 to 1012 feet in height. These cliffs contain the nesting places for the largest bird rookery in the Northern Hemisphere. The valleys between the hills are covered with heavy vegetation overlying ridged "niggerheads" which are exceedingly difficult to walk over. Sphagnum bogs surround many small lakes on the flat areas of the lower ground.

About one-half of St. Paul Island is similar to St. George. The other half has sandy soil and along the coast line there are long stretches of wind-drifted sand dunes partly covered by moss and grasses. A number of dead volcanic cones, which are not found on St. George, are scattered over the island. The craters usually contain shallow lakes. The outline of St. Paul is more irregular than that of St. George, making the area about the same. The greatest length is 13.5 miles and the width 7.5 miles. The highest point is a volcanic peak 690 feet in height.

FLORA

There are no erect trees although creeping willows are found all over both islands. Five species have been listed, the most common being Salix arctica Pall. Other shrubs, more or less common, are: Black Crowberry, Empetrum nigrum L.; Trailing Azalea, Loiseleuria procumbens Desv. (rare on St. Paul); Northern Dwarf Cornel, Cornus suecica L.; Raspberry, 3 species of Rubus; and Mountain Cranberry, Vaccinium vitis-idaea L. Many of the rocky areas are densely covered with Crowberry, making an excellent carpet over which to collect Epipsiliamorpha alaskae Grt., Psychophora sabini Kirby, P. phocata Moesch. and Parasemia subnebulosa Dyar. Among the sand dunes near the beaches large areas are densely carpeted with the Beach Pea, Lathyrus maritimus Bigel. The predominant grass on the sand is Downy Lyme-grass, Elymus mollis Trin. Polemonium occidentale Green, Jacob's Ladder, is generally distributed about the margins of the drifting sand areas. Many Lasiestra have been taken while feeding on blossoms of P. lanatum. With the exception of the grasses the Northern Lupine, Lupinus nootkatensis D. Don, is probably the plant occurring in greatest abundance. When it is in bloom the landscape takes on a bluish tinge. A little later the Louseworts, Pedicularis, with their pink and red spikes contribute to the color scheme. The Arctic Poppy, Papaver nudicaule L., also occurs all over the islands except in the areas of dense grass. The largest annual found on the islands is what the natives call "Poochka", a species of Wild Celery, probably Heracleum lanatum Michx. The stalks and root are edible and used by the natives for greens. The blossoms are large umbels, sometimes six inches in diameter, which are densely covered with flies when in full bloom. On the uplands Saxifrage is found growing on bare scoria patches where no other plant will live. In all, about 200 forms of plant life have been credited to the Pribilof Islands.

FAUNA

Of the sea mammals visiting the islands regularly the fur seal is by far the most important. They begin to arrive at the rookeries late in April and remain through the breeding season until November when the pups have learned to swim and secure food. In 1910 when the United States Government took over control of the herd, pelagic sealing had reduced its numbers to 125,000 animals. A policy of conservation was established and only the surplus males killed. At present the herd numbers about 3,000,000 animals and a net profit of about $1,000,000 is turned into the United States Treasury annually. It is an excellent case of economic conservation. Besides the fur seals, the Steller Sea Lion and the Pribilof Harbor Seal breed on the islands. Land mammals include the Reindeer (introduced in 1911), the House Mouse, the Pribilof Lemming on St. George only, the Pribilof Shrew on St. Paul only, and the Blue Fox. The herds of foxes on both islands are managed by the United States Government.

Land birds remaining on the islands the year round are the Aleutian Rosy Finch, Leucosticte griseonucha Brandt; Pribilof Snow Bunting, Plectrophenax nivalis townsendi Ridgeway; Alaska Longspur, Calcar-

ius lapponicus alascensis Ridgeway; Alaska Wren, Troglodytes troglodytes alascensis Baird; and the Snowy Owl, Nyctea nyctea L. The wren is called "Limmershin" meaning "chew of tobacco" by the natives. The Pribilof Sandpiper, Arquatella maritima ptilocnemis Coues, breeds on the islands. The Pribilof Islands are especially noted for the migrants and accidental visitors. On the enormous nesting rookeries on all cliffs of both islands are found the Pallas Murre, California Murre, Horned Puffin, Tufted Puffin, Paroquet, Crested, and Least Auklets, Pacific and Red-legged Kittiwakes, Gulls and many others. The Least Auklet is one of the earlier arrivals in the spring and they come in unbelievable numbers. About the size of a robin they are highly prized as an addition to the food supply. The native name is "Choochkie". The Kittiwakes are also favored by the natives as food. With a fox herd large enough to produce 1,000 skins annually it seems strange that birds could successfully maintain nesting grounds. The Golden Plover, in its great migration southward in the fall, lands to feed on Crowberry berries.

The Pribilof Islands are particularly rich in insect life. They are fortunate, however, in being entirely free of mosquitoes. The Head Louse, Pediculus capitis De Geer, and the Clothes Moth, Tinecola biselliella Hum., are the only two forms of insects noxious to human beings. Even flies although they sometimes cover the warm or sunny sides of buildings do not enter the houses except by accident. The large "blue bottle" fly whose larva makes short work of a seal carcass was nearly exterminated in 1942 when the islands were evacuated and no seal killings made on account of the war. As all seal carcasses are now handled by a rendering plant, the flies will probably never regain their former numbers. Unusually large bumblebees are found on the islands. The beetle Cicindela truncaticollis Esch. is common on both islands. Its variation in color from a bright metallic green to copper makes it a beautiful and showy insect. In 1923, the Department of Agriculture published a Biological Survey of the Pribilof Islands listing the known fauna. In it 8 species of Lepidoptera were listed by Wm. T.M.Forbes of the Department of Entomology at Cornell University (Forbes, 1923). E.P. Van Duzee published a list of Pribilof Lepidoptera in 1921.

RHOPALOCERA

There is no record of a butterfly having been caught on the Pribilof Islands. The writer has collected there every summer 1939 to 1947 except in 1942 and has never seen one. At King Cove, a village near the tip of the Alaska Peninsula, a few specimens of a small form of Pieris napi L. have been taken. It would be interesting to know why butterflies have not become established on the Pribilof Islands. The climate does not differ greatly from that of the nearest mainland and food plants are plentiful.

HETEROCERA

ARCTIIDAE

1. Parasemia subnebulosa Dyar. Exceedingly hard to net due to its swift flight in fairly straight lines. On cool days a few specimens can be found resting on lupine or clumps of moss. Most of my specimens were taken by first locating a colony of larvae, which feed on lupine, and then watching that area for the emerging insects. On June 26, 1946, I picked up 125 of the most mature larvae I could find, hoping to rear them for some good specimens. By August 9, 111 had pupated and the balance had died. August 15, every cocoon as far as I could see was filled with smaller cocoons which shortly produced small Hymenoptera (?). On August 26 one female specimen of subnebulosa emerged. It was not a profitable experiment. It may be that if I had collected the youngest larvae instead of the oldest, the results would have been different. Pupation occurs in a light, thin, moss-covered cocoon on the surface of the carpet of moss. This moth is found on both islands.

NOCTUIDAE

2. Epipsiliamorpha alaskae Grt. Collected on both islands over Crowberry beds. The wings of the female are so reduced in size that they cannot fly. Pupation occurs 3 or 4 inches under the Crowberry. On July 18, 1943, while walking over a patch of Crowberry I noticed several moths hovering over and landing at a certain spot. They paid no attention to my approach. I suspected that a female was responsible for the commotion but could not locate her. So I sat down and caught the males including several new arrivals. As this was much more comfortable collecting than running after moths on the wing I stayed there for an hour securing over 30 specimens. The wind was light, about 12 miles per hour. I saw several males flying across a line extending down wind from where I was at least 100 feet distant (I stepped it off). As soon as the flyers hit this line or beam they immediately changed course to fly straight to the spot which had interested the others. It was late in the afternoon and rapidly getting cooler so I started looking for the female. About 3 inches under the Crowberry in decaying leaves I found a pupa from which a female emerged next day. Apparently the males while flying can detect and locate a female pupa underneath its natural cover from a distance of at least 100 feet. The extreme variation in color common in so many northern species is also found in alaskae. I have specimens ranging from light cream to dark brown.

3. Lasiestra sp. Collected on St. Paul Island where it was found in considerable numbers at the top of the slope to the beach of English Bay opposite Telegraph Hill. Practically all my specimens were taken while the moths were feeding on the blossoms of P. lanatum. The moths seemed to become drugged by the nectar and in that condition were easy to capture. Dr. J. McDunnough's comment on this species follows (in litt. 1940): "1794. What you have doubtfully under this number is not Anarta richardsoni but a Lasiestra sp., possibly close to staudingeri (which I do not know) or undescribed. The genitalia seem quite distinct from richardsoni and the vestiture is more hairy...". This is probably the same species listed by Forbes (1923) as Anarta richardsoni Curtis.

4. Crymodes murrayi race? Collected on St. Paul Island at various places but most common among the

Johnston: LEPIDOPTERA OF THE PRIBILOF ISLANDS - cont.

sand dunes on both sides of Big Lake. Its food plant is L. maritimus. McDunnough (in litt. 1942) states: "Your long series was most interesting and showed the great variability occurring in the species. This same variability is found in the closely allied Crymodes exulis Lef. from the eastern Arctic region (Labrador, Greenland, Iceland, etc.), and you can get an idea of all the names involved by consulting Hampson, Vol.VII, p.423. I have checked carefully on these names and find your specimens in general match most closely Herrich-Schaeffer's figure of borea from Iceland and said to occur (according to Guenée) in Boreal America and Lapland. The pale-lined veins are well-defined in H.-S. figure, but my few Iceland specimens give a rather different impression from your St. Paul series and in consequence I am doubtful if these latter can be called borea H.-S. None of your specimens matches very well with our type of Crymodes murrayi Gibs. to which I was inclined to assign your previous specimens; murrayi is a dull gray thing with no pale veins, your No. 957 being closest. After making several genitalic slides I find the Iceland borea matches up well with the Labrador exulis and both show slight (possibly merely racial and not specific) differences from your St. Paul Is. thing, which fits, however, very closely with murrayi Gibs. I would suggest ... that the St. Paul specimens be named as a race of murrayi, differing in the darker color and white-lined veins. This would be then the counterpart in the Northwest of the race borea of exulis."

GEOMETRIDAE

5. Psychophora sabini Kirby. Collected over the Crowberry beds of both islands.

6. Psychophora phocata Moesch. These two species are always found flying together and can be separated by the pectinations on the male antennae. In sabini the pectinations are short and claviform while in phocata they are longer showing less obvious thickening terminally. Both species show an extraordinary degree of variation. I have specimens almost pure black and others cream colored. In fact, in over 200 specimens it is hard to find two alike.

PYRALIDAE

7. Diasemia alaskalis Gibs. Collected on St. Paul Island but not common in any locality. McDunnough thinks this may be misplaced generically but the specimens agree with the holotype of D. alaskalis.

8. Titanio sp. Forbes (1923) reports this from St. Paul Island but I was unable to find it.

9. Phlyctaenia washingtonalis Grt. Common on both islands in all localities, especially in the grassy valleys.

10. Ephestiodes sp. I have one specimen from St. Paul Island which is referable to this genus.

PTEROPHORIDAE

11. Platyptilia johnstoni Lange. Collected at several localities on both islands but not common.

OLETHREUTIDAE

12. Aphania frigidana Pack. Collected on St. Paul on the east slope of the Polovina volcanic cone. Maculation ranges from dark immaculate specimens to those with white apical areas.

13. Olethreutes schulziana Fabr. Collected on St. Paul Island at Kaminista, a deep volcanic dash formed when large boulders were piled high on each side.

14. Eucosma dodana Kft. ? Collected on the slopes of various volcanic cinder cones on St. Paul Island. McDunnough states (in litt. 1940): "Slides of male genitalia agree pretty closely with Heinrich's figure of this species. There is only a single female in our collection for comparison and it is much larger, but the maculation is quite similar. A slide of the male of your two unicolorous smoky specimens shows the same genitalia so I suppose these represent a suffused melanic form. Dodana occurs in Colorado and Albertan Rockies so I imagine it might be found at sea level in the far north. My identification is, however, rather tentative and will have to be checked when the males of Albertan dodana are available."

TORTRICIDAE

15. Tortrix moeschleriana Wocke. Common on St. Paul Island around the volcanic cones. Single specimens collected elsewhere were probably scattered by the wind. The species is very variable as to color and maculation ranging from pale immaculate yellow through yellow and brown heavily marked with brown bars to a dark brown without markings. The genitalia are similar in all forms.

GELECHIIDAE

16. Gnorimoschema sp. Collected on bare sand and under moss on the slope above the beach of English Bay opposite Telegraph Hill. McDunnough places this close to contraria Brn. found in western Alberta.

17. _____. I have four specimens collected on St. Paul Island belonging to the family Gelechiidae. Determination of the genus and species has not been made.

OECOPHORIDAE

18. Borkhausenia pseudospretella Staint. Van Duzee (1921) lists this species but I have not found it.

TINEIDAE

19. Tineola biselliella Hum. This moth has ruined many carpets and clothes on St. Paul Island and should be found on St. George.

INCURVARIIDAE

20. Greya sp. Occurs on both islands. St. Paul Island specimens were collected at Kaminista. They were found on the sides of the large lichen-covered

boulders. Both McDunnough and Heinrich agree on the genus and that it is undescribed. St. George specimens were found along the edge of a sphagnum bog roosting on the blades of a small species of Carex. The maculation of specimens caught on St. George is, in all cases, quite different from those caught on St. Paul.

My collecting on St. Paul Island has been limited to the period June 20 to August 1 each year and on St. George Island to the last week of July only. Consequently, it is quite possible that more extended collecting on both islands would produce additional forms of Lepidoptera.

REFERENCES

Forbes, W.T.M. 1923. "Lepidoptera" in U.S.D.A. Bur. Biol. Surv., No. Amer. Fauna, no.46, pt.2: pp.147-149.

Van Duzee, E.P. 1921. Proc. Calif. Acad. Sci., (ser.4) vol.11: pp.194-195.

FRANK JOHNSON AS A LEPIDOPTERIST

Never given to much conversation, - a listener rather, as I knew him, - Frank Johnson once told me that his pursuit of butterflies started as a way of interesting his oldest daughter in the out-of-doors; it offered an incentive for a walk in country byways and fields. The creatures, however, fascinated him and this interest became a relaxing avocation, the antithesis of an active and highly successful business life.

As I recollect, I first met Frank Johnson some twenty years ago at a meeting of the New York Entomological Society. It was some years later that I became acquainted with his collection and came to understand his particular interests and approach to entomolcgy. He had a very keen eye for differences and knew the species in his collection. He mastered the names and was quick to recognize a species which was new to his collection. He depended upon the late Dr. William Schaus for determinations that proved difficult and as a result of his friendship for Schaus enriched the collection of the U.S. National Museum by generous gifts of specimens.

For the preservation of his collection Mr. Johnson designed a strong glass-topped drawer, the bottom of which was formed by a sheet of balsa wood one quarter inch thick. This drawer had an ingeniously designed, tight-fitting cover and was very light to handle. He used three hundred drawers closely stowed in metal racks and this set a limit to the size of his collection. The technique of preparation was a pleasure and relaxation for Mr. Johnson and he spread a large number of the specimens in his collection rapidly and neatly.

Always interested in large, brilliant species, one of his early specialties was the genus Papilio. After having realized his ambition by acquiring a large collection of species from all parts of the world, he disposed of them and turned to Morpho. This Morpho collection, as painstakingly assembled as had been the Papilio collection, he presented to the American Museum of Natural History some years ago. In it there were about ninety per cent of the named forms, represented by about 600 specimens. Mr. Johnson told me that this collection represented a choice selection of the most perfect specimens out of an original aggregate of 10,000 examples. His interest in Morpho waned when he could no longer get new varieties easily and he disposed of it to make room for other things. He had also fine collections of Brassolidae and many genera of Nymphalidae. Among the latter his collection of Anaea was outstanding, represented by about 6,000 specimens, probably the largest single private collection of this genus. It contained almost all of the named species and many undescribed species. The series was large, representing localities of wide distribution in Central and South America.

The Saturniidae were also a fascination for him. Mr. Johnson acquired them in huge quantities, leading to the discovery of many new species and subspecies.

Mr. Johnson made some short collecting trips in the Antilles, Central and South America, but he mainly relied on the collectcrs he employed to supply the material. At one time or another he had collectors working in every country of Central and South America, sending great supplies of butterflies and moths.

A patron of the American Museum of Natural History, he aided the Department of Entomology by financing expeditions to Central and South America and in the employment of tropical collectors. Through his contributions more than 300,000 specimens in all orders were added to the museum collections during the last ten years. Mr. Johnson also supported research leading to the preparation of several monographs, one on the genus Anaea of the Nymphalidae and several on genera of the Saturniidae. As yet these papers have not been published.

Frank Johnson was born in Kansas City, Missouri, the son of Andrew M. and Mary Bernard Johnson. He apparently started work for Burdett-Rowntree Mfg.Co. in Chicago, about 1900. He was with General Pneumatic Co., producer of railroad equipment, about 1910. This firm later became the National Pneumatic Co. and he became its president, retiring in 1946. He was head of Canadian Elevator Equipment Co. and director of other companies. Living in the Middle West for some years, he later made his home in Glen Ridge, New Jersey, and finally established himself at Lespedeza Farm in Griffin, Georgia. He died in New York City on October 19, 1949, at the age of 71 years.

His entire collection and library were left to the American Museum of Natural History.

- William P. Comstock

PERSONALIA

Harvard College, of Cambridge, Massachusetts, has just announced the appointment, effective July, 1950, of Dr. JAMES H. McDUNNOUGH to the staff of the Department of Insects of the Museum of Comparative Zoology. Dr. McDunnough is now in the Dept. of Insects and Spiders of the American Museum of Natural History in New York. The M.C.Z. is most fortunate in having secured Dr. McDunnough, the dean of American lepidopterists. His long list of important papers may have obscured the substantial curatorial role he has had in developing and organizing collections of North American Lepidoptera in Washington (the Barnes Collection), Ottawa, and New York. The Andrew Gray Weeks Room of Lepidoptera at the M.C.Z. contains the Scudder collection, much of Packard's material, the poorly described and numerous Cassino and Swett Geometridae types, the large world-wide Weeks collection, and many more, but there has been no general lepidopterist in charge of the room for many years. Thus there now exists a state of disorganization which can be expected to give way to order under Dr. McDunnough's care. He will also continue his revisions of difficult groups of North American noctuids.

C.A. ANDERSON, 3209 Centenary, Dallas 5, Texas, is releasing large numbers of reared and marked specimens of the Monarch Butterfly (Danaus plexippus) in the attempt to obtain definite information on Monarch movements. In 1949 he released 681 specimens and in spite of extensive nation-wide publicity he received only one report which could possibly relate to his Monarchs. We also know of three other Society members who systematically marked Monarchs in the fall of 1949. Lep. News readers are urged to examine carefully all Monarchs and to capture all specimens with numbers, letters, or man-made holes and send them to us. We will immediately send reports to the original markers and arrange to have the recoverer notified of the origin of his specimens. In another year we hope to launch an extensive coordinated program of marking of the Monarch and other Lepidoptera.

We regret having to report the passing of DEAN F. BERRY on 10 May 1949 at Orlando, Florida. Mr. Berry was disabled as a soldier in World War I and devoted his remarkable energies to the pursuit of Florida Lepidoptera. In spite of being seriously incapacitated he became one of the most distinguished collectors in Florida history. Atrytone berryi Bell, among others, attests to his field success. Mr. Berry discovered the haunts of the fabulously rare Catocala sappho and over the years distributed scores of superb specimens to the museums and private collections of North America. His special interests were with the Sphingidae, Catocala, Hesperidae, and Lycaenidae. As far as we know, he published no papers himself, but he was a contributor to the Field Season Summary for 1947. He was a Charter Member of the Lepidopterists' Society.

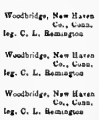
PLEASE NOTIFY THE NEWS OFFICE PROMPTLY OF CHANGES OF ADDRESS

LABELS AND PINS

While we cannot make a practice of endorsing products in the Lep. News, it should be of considerable value to many readers to report two commercial firms which produce important products for insect collectors outstandingly well.

Disliking photographically produced data labels and having tried a number of printers of these labels (to go on insect pins under mounted specimens), we have finally found one which does a perfect job, prints the labels in the most time-saving form, and is low in price. After dealing with them for several years we can recommend them highly. They print 2, 3, or 4 line labels, in either 3 1/2 or 4 point type, in strips of about 40 labels trimmed closely at the sides and ready to have the date (or other data) written in. The collector merely clips the needed labels from the strip, one cut per label. The prices are 50¢ per 500 of one exact label, 75¢ per 1000, and 50¢ for each additional 1000 of the same label. Collectors usually want a good supply for each important locality they visit often so that strips can be sent along with specimens being exchanged and correspondents saved a tremendous amount of labor. The company is:

The Nature Company
P.O. Box 403
Covington, Louisiana



Samples are provided on request and one is shown here of labels in 3 1/2-point type. It is reduced by one-half in printing the News.

The second dealer produces the first insect pins of really top quality and reasonable price which we have seen offered since before the war. A great stir of pin-producing followed the long wartime shortages and millions of very bad European pins were bought, at least in the U.S.A. We recently purchased from Germany several thousand pins after seeing samples and we find them excellent with the single defect that an occasional head comes off a pin shaft under stress. This dealer offers the standard black steel pins, sizes 00-8, postpaid at $0.90 (U.S.) per 1000; anti-corrosive white steel pins, sizes 00-7, at $1.35 per 1000; and black steel minuten nadeln (for tiny micros, etc.) at $0.40 per 1000. The address is:

Insektennadelerzeugung
Solaristrasse 14
Salzburg, AUSTRIA

C.L.R.

The founding of a new German-language lepidopterological periodical has just been announced. Its title is Zeitschrift für Lepidopterologie. The editors are: Dr. Max Cretschmar, Albert Grabe, and Georg Warnecke. The first volume will include 192 pages when complete. The subscription price is 16 German Marks per year and should be sent to: Goecke and Evers, (22a) Krefeld, von Beckerrathplatz 9, Germany. We extend our best wishes for the success of this new periodical and urge all lepidopterists who read German easily to subscribe now to the Zeitschrift. The first volume will doubtless quickly become scarce.

176. Anonymous, "The Yellow Maize Moth (Dichocrocis punctiferalis)." Agr. Gaz. N. S. Wales, vol.58: p. 428. 1 Aug. 1947.

177. Anonymous, "The Army Worm (Cirphis unipuncta)." Agr. Gaz. N. S. Wales, vol.58: pp.428-429. 1 Aug. 1947.

178. Balli, Antonio, "Su la morfologia e la biologia di Saturnia pavonia L." [In Italian]. Atti Soc. Nat. Mat. Modena, vol.78: pp.131-146. 1947. Includes descriptions of all stages and summary of range. [P.B.]

179. Balli, A., and C. Moscardini, "I Lepidotteri del modenese. Contributo alla loro conoscenza sistematico-biologica (Nota II)" [In Italian]. Atti Soc. Nat. Mat. Modena, vol.78: pp.149-172. 1947. Describes biology of 10 spp. [P.B.]

180. Beacher, John H., "Studies of Pistol Case-Bearer Parasites". Ann. Ent. Soc. Amer., vol.40: pp.530-544. Sept. 1947. 16 spp. attacking Coleophora malivorella are discussed. [P.B.]

181. Beck, Stanley D. and J.F. Stauffer, "An Aseptic Method for Rearing European Corn Borer Larvae." Journ. Econ. Ent., vol.43: pp.4-6, 1 fig. Feb. 1950. Artificial rearing medium of agar, glucose, casein, yeast, etc. described in detail. [C.R.]

182. Bennett, N.H., "Revision of the Echerius group of the genus Abisara Felder (Rhop. Riodinidae)." Entomologist, vol.83: pp.1-9, 34-42, 21 figs. Jan., Feb. 1950. Describes as new: A. echerius lisa (Hainan); A. e. notha (Tonkin, Annam); A. e. clara (Bangai); A. geza sura (E. Sumatra); A. kausambi daphne (Nias); A. k. asoka (Borneo); A. saturata baraka (Manipur); A. s. maya (S. Burma); A. s. corbeti (Mindanao). Genitalia of both sexes figured for each of the 6 spp., and described for the 44 subspp. Keys to spp. by pattern and by ♂ genitalia. [P.B.]

183. Blair, K.G., "Notes on the Life History of Sedina buettneri Hering (Lep., Caradrinidae)." Ent. Monthly Mag.,vol.86: pp.47-49. Feb.1950. Describes egg and larval stages. Foodplants: Carex,Glyceria.[P.B.]

184. Boné, G.J., "Regulation of the Sodium-Potassium Ratio in Insects." Nature, vol.160: pp.679-680. 15 Nov. 1947. Larvae of Ephestia kühniella, Pieris rapae, Vanessa urticae, and other insects, raised on diets containing abnormal Na/K ratios showed no major changes in hemolymph Na/K ratio, showing that this proportion is specific for each species and regulated by the organism. [P.B.]

185. Boyce, H.R., "Long term trends in parasitism of twig-infesting Oriental fruit moth larvae." Ann. Rep. Ent. Soc. Ontario, no.77: pp.21-34. 1947.

186. Chermock, Ralph L., "Subspeciation in Neophasia menapia Behr [sic] (Lepidoptera, Pieridae)." Proc. Ent. Soc. Wash., vol.52: pp.44-45. Feb. 1950. Restricts N. m. menapia (Felder) to Utah, Colorado, New Mexico, northern Arizona, and southern Wyoming, and removes N. m. tau (Scudder) from the synonymy for the subspecies occurring in California northward to British Columbia, and eastward to Idaho and Montana, giving the characters that separate the two subspecies. [C.dP.]

187. Collenette, C.L., "The Identity of Phalaena chrysorrhoea, Linnaeus, 1758." Bull. Ent. Res., vol.38: pp.259-261. 21 Aug. 1947. Concludes that chrysorrhoea should apply to the brown-tail. The matter still seems ambiguous, and should probably be decided by the International Commission. [P.B.]

188. Collenette, C.L., "The Lymantriidae of Celebes." Ann. Mag. Nat. Hist. (ser.11), vol.14: pp.1-60, 5 pl. 19 Nov. 1947. Locality records for specimens of 124 spp. and subspp. Describes as new: Leucoma loda, Redoa tossa, Kanchia dinawa gymnoteca, Cispia dipyrena, Euproctis euphlebodes, E. varians tjamba, E. docima, E. parthena, E. polytoca, E. thysanocyma, E. acompsa, E. xanthopoda, E. coniortodes, E.phaulia, E. aeola, E. abythosticta, E. tompoe, E. acosmeta, E. cupeperata, E. icoinnotata, E. maros, E. rectifascia, E. rhabdoides, E. copha, E. acmaea, E. metatropa, E. chionobola, E. ochrias, E. paraleuca, E. udenosura, E. hyalogenys, E. loda, E. pedolepida, E. paloe, E. melanoxutha, E. lindoe, E. climax, E. dine, E. lithorrina, E. psolarga, E. p. melanarga, E. bolinoides, E. parentheta, E. hypopyra, E. epiperca, E. dolichoptera, E. acroptera, E. todjamboe, E. kalisi, Lymantria demotes, L. celebesa, L. chroma, Dura leptodes, D. passonyx, D. isabella, D. centama Laelia nebrodes, L. rhodea, Dasychira euryptila, D. dolichoscia, Lucharna strigipennis epiperca. The ♂ genitalia of some of these are described or figured. Almost all new entities, and some other species, are figured. [P.B.]

189. Collier, A.E., "A Note on the Genetics of Aphantopus hyperantus ab. crassipuncta and Maniola jurtina ab. semialba." Entomologist, vol.83: pp.25-26. Feb. 1950.

190. Dathe, H., "Samia cynthia Wlk. in Venetien" [In German]. Ent. Zeitschr., vol.59: pp.161-162. 1 Feb. 1950. Records of the wild occurrence of S. cynthia in northern Italy. [G.dL.]

191. Dexter, Ralph W., "A Checker-spot Butterfly with Three Antennae." Turtox News, vol.25: p.145, 1 fig. Aug. 1947.

192. Doucette, Charles F., "Stem Borer Attacking Lilies." Journ. Econ. Ent., vol.40: p.918, 1 fig. Dec. 1947. Borer is Emboloecia. [P.B.]

193. Dumbleton, L.J., "Transportation of Insects on the Exterior of Aircraft." Nature, vol.165: p.452. 18 March 1950. Lepidopterous eggs found. [P.B.]

194. Eliot, Nevill, "More on Continental Drift, Precis lavinia Hbn. and P. villida F.: a Postscript." Entomologist, vol.80: p.283. Dec. 1947.

195. Evans, William H., "Life History Notes on Incita aurantiaca Hy.Edw." Pan-Pacific Ent., vol.26: p.21. Jan. 1950. Describes habits and mature larva. Host - Gilia virgata. [C.R.]

196. Finney, Glenn L., Stanley E. Flanders, and Harry B. Smith, "Mass culture of Macrocentrus ancylivorus and its host, the potato tuber moth." Hilgardia, vol.17: pp.437-482, 22 figs. Aug. 1947.

197. Fraenkel, G., and M. Blewett, "The Importance of Folic Acid and Unidentified Members of the Vitamin B Complex in the Nutrition of Certain Insects." Biochem. Journ., vol.41: pp.469-475. 1947. Ephestia and other insects. [P.B.]

198. Fraenkel, G., and M. Blewett, "Linoleic Acid in the Metabolism of Two Insects, Ephestia kuehniella (Lep.) and Tenebrio molitor (Col.)." Biochem. Journ., vol.41: pp.475-478. 1947.

199. Franclemont, John G., "The Linnaean subgeneric names of Phalaena (Lepidoptera, Heterocera)." Journ. N.Y. Ent. Soc., vol.58: pp.41-53. Mar. 1950. This interesting paper gives an historical sketch of the problem and concludes that in view of the uncertainty about the choice of the work from which to date the names discussed, and to maintain the names in the same sense as that in which all the pertinent literature has been built up, the International Commission on Zool. Nomenclature will be requested to suspend the Rules and validate certain names as of 1758, suppress another, validate another as of 1767, and designate certain types. This is a wise move and one it is to be hoped other specialists will follow. [C.dP.]

200. Gibson-Hill, C.A., "Lepidoptera (Heterocera) (Christmas Island)." Bull. Raffles Museum, no.18: pp. 74-80. Oct. 1947. Lists, with notes, 1 possible and 9 certain residents and 4 migrants. [P.B.]

201. Greer, Thomas, "Lepidoptera Around a Moorland Bungalow in East Tyrone." Entomologist, vol.80: pp.183-186. August 1947.

RECENT LITERATURE ON LEPIDOPTERA - cont.

202. Grison, Pierre, "Développement sans diapause des chenilles de Euproctis phaeorrhoea L. (Lep. Liparides)" [In French]. C. R. Acad. Sci., vol.225: pp. 1089-1090. 1 Dec. 1947. Fed young apple leaves and kept at 25° C. and 100 °/o humidity. [P.B.]

203. Heinänen, V.L., "Beobachtungen über die Makrolepidopterenfauna der Gegend von Lahti in Sudfinnland" [In Finnish, German summary]. Acta Ent. Fennica, no.2: 72 pp., 8 figs. 17 Sept. 1947. Discussion of faunal zones, with annotated list of spp. [P.B.]

204. Heller, Jósef, "Investigations on Insect Metamorphosis. Part XIV. The Regulation of the Metabolism during Pupal Stage. The Role of Tyrosinase" [In Polish, English summary]. Acta Biol. Exp., vol.14: pp. 229-237. 1947. Study of the respiratory enzyme system of Deilephila euphorbiae pupae. [P.B.]

205. Heqvist, Karl-Johan, "Bidrag till kännedom om fjärilsfaunan inom Muddus nationalpark" [In Swedish]. Ent. Tidskr., vol.68: pp.193-195, 1 fig. 25 Oct. 1947. Annotated list of Lepidoptera. [P.B.]

206. Herms, William B., "Some problems in the use of artificial light in crop protection." Hilgardia, vol.17: pp.359-375. Apr. 1947. Discussion of light traps. Data on effects of intensity and wave length on the insects attracted. [P.B.]

207. Hrbek, J., "Lepidopterologický průzkum Olomoucka" [In Czech]. Acta Soc. Ent. Čechosloveniae, vol.44: pp.133-135, 1 fig. 1 Dec. 1947.

208. Javillier, Maurice, "Sur les pigments ptériniques d l'aile et de l'oeuf de Bombyx mori L." [In French]. C. R. Acad. Sci., vol.230: pp.585-587. 6 Feb. 1950. Reports similar blue-fluorescing pterins in egg and wing. Suggests that pterins are used as precursors of riboflavin. [P.B.]

209. Kauffman, Guido, "Remarques concernant deux aberrations de Pyrgus carlinae Rbr. (Lep. Hesperiidae)" [In French]. Mitt. Schweiz. Ent. Ges., vol.23: pp. 67-69, 2 figs. 15 Feb. 1950.

210. Korringa, P., "Waarnemingen en overpeinzingen betreffende Macrothylacia rubi L." [In Dutch]. Tijdschr. Ent., vol.88: pp.493-498. 1 Oct. 1947.

211. Le Clercq, Jean, "Mise en évidence de réactions au gradient d'humidité chez plusieurs Insectes" [In French]. Arch. Internat. Physiol., vol. 55: pp.93-116. Dec. 1947. Reports tests on insects of 7 orders to determine humidity preferences. Results entirely negative for Pieris larvae, which ignored humidity gradient. [P.B.]

212. van Leeuwen, E.R., "Increasing Production of Codling Moth Eggs in an Oviposition Chamber." Journ. Econ. Ent., vol.40: pp.744-745. Oct. 1947.

213. Lempke, B.J., "The Variation of Lymantria monacha, L." Ent. Rec. Journ. Var., vol.59: pp.81-86. July/Aug. 1947. Attempts to correlate described aberrations with Goldschmidt's carefully analyzed mutant forms, which he summarizes briefly. Also names 5 'forms', apparently from Goldschmidt's descriptions. There is NO evidence that the naturally occurring mutants are genetically similar to Goldschmidt's stocks. This paper appears to be neither good taxonomy nor good genetics. [P.B.]

214. Lempke, B.J., "Some Remarks on Biston betularia." Ent. Rec. Journ. Var., vol.59: pp.88-89. July/Aug. 1947. Quote: "f. mixtus Voss is not a synonym of insularia, but a perfectly valid name, indicating the heterozygotes of carbonaria. That it is distinguished by a name is fully justified by the fact that its genetic constitution is different from f. carbonaria." This doctrine reduces taxonomy to absurdity, since in all probability no two individuals are genetically identical. [P.B.]

215. Lingonblad, Birger, "Forteckning över Muonio och Enontekiö socknars storfjärilfauna. (Macrolepidoptera)" [In Swedish]. Mem. Soc. Fauna Flora Fennica, vol.23: pp.121-137. 1947. Records of 241 spp. in parts of Finland. [P.B.]

216. Manunta, Carmela, "Comportamento differenziale, nel metabolismo dei pigmenti, di varie razze ed incroce - bianchi recessivi, bianchi dominante e gialli - di Bombyx mori" [In Italian, summaries in Latin, English and German]. Scientia Genet., vol.3: pp.33-42. 1 Dec. 1947. White dominant larvae cannot maintain carotenoid pigments in blood. [P.B.]

217. Manunta, Carmela, "Nuovo contributo allo studio del bianco dominante nei bachi da seta" [In Italian, summaries in Latin, English and German]. Scientia Genet., vol.3: pp.43-47. 1 Dec. 1947. Yellow color of blood dependent on ability to absorb carotenoids and release them from blood cells. [P.B.]

218. Manunta, Carmela, "Sul metabolismo dell' azoto nelle varie razze di bachi da seta. 1. L'acido allantoinico nella razza bivoltina giapponese Awojiku" [In Italian, summaries in Latin, English and German]. Scientia Genet., vol.3: pp.48-55. 1 Dec. 1947. Studies of uric acid formation in 'opaque' and 'transparent skin' races of B. mori. [P.B.]

219. Manunta, Carmela, "Sul metabolismo dell' azoto nelle varie razze di bachi da seta. 2. Acido allantoinico ed acido urico durante la maturazione nel sangue di varie razze ed incroci" [In Italian, summaries in Latin, English and German]. Scientia Genet ., vol.3: pp.56-66. 1 Dec. 1947. Correlation between allantoic and uric acid content. [P.B.]

220. Mariani, Mario, and Mario de Stefani, "Fauna Lepidopterorum Italiae. Parte II.- Larve dei Lepidotteri d'Italia ordinate secondo le piante nutrici" [In Italian]. Giorn.Sci.Nat.Econ.Palermo, vol.43,no.5: 152 pp. 1947. Lists over 4100 spp. arranged by foodplant (502 spp.); designed to simplify identification of larvae, and should be invaluable for this purpose. [P.B.]

221. Marion, H., "Tube 'Newman' pour les micros" [In French]. Rev. franç. Lépid., vol.11: pp.174-175, 1 fig. 22 Oct. 1947.

222. Maude, E.W., "An aberrant form of Neptis hylas astola." Journ. Bombay Nat. Hist. Soc., vol.46: p.738, 1 pl. April 1947.

223. Michener, Charles D., "A Northern Subspecies of Eacles imperialis (Lepidoptera, Saturniidae)." Journ. Kansas Ent. Soc., vol.23: pp.17-21, 5 figs. Jan. 1950. Describes as new: E. imperialis pini (Cheboygan Co., Mich.); with figures of types and distribution map. Host is pine. [C.R.]

224. Michener, Charles D., "New Genera and Subgenera of Saturniidae (Lepidoptera): a Correction." Journ. Kansas Ent. Soc., vol.23: p.26. Jan. 1950. Corrects printer's error on new subgenus Ptiloscola in earlier paper (see Lep. News 3: p.111). [C.R.]

225. Miklazewska, A., "Experiments on the plasticity of instinct in caterpillars of Nymphula nymphaeata L. (Lepidoptera- Pyralidae)." Bull. Int. Acad. Polonaise, Cl. Sci. Math. Nat. BII 1947: pp.279-297, 6 figs. 1947. Describes natural case-making in this species and experiments in which substitutes for Nymphaea leaves must be used. [P.B.]

226. Morley, A.M., "Aplasta ononaria in 1946." Entomologist, vol.80: pp.168-169. July 1947.

227. Munro, H.A.U., "The Durra Stem Borer Sesamia cretica Led. A New Problem in Imported European Broom Corn." Can. Ent., vol.79: pp.180-184, 2 figs. Sept.-Oct. 1947.

228. Newton, J., "Macrolepidoptera in Tetbury, Gloucestershire, 1949." Entomologist, vol.83: pp.28-30. Feb. 1950.

229. Oiticica F°, José, and Charles D. Michener, "New species of Bathyphlebia from Ecuador and Peru (Lepidoptera, Saturniidae)." Am. Mus. Novitates, no.1446: 13 pp., 15 figs. 5 Jan. 1950. Describes as new: B. johnsoni (Peru); B. johnsoni flavior (Peru); B. rufescens (Ecuador). [P.B.]

230. Oiticica F°, José, and Charles D. Michener, "A new species of Eacles from Colombia (Lepidoptera, Saturniidae)." Am. Mus. Novitates, no.1447: 5 pp., 7 figs. 5 Jan. 1950. Describe as new E. johnsoniella. [P.B.]

231. Paclt, Jiři, "La révision de la nomenclature des familles lépidoptérologiques de la faune Tchécoslovaque" [In Czech, French summary]. Acta Soc. Ent. Čechosloveniae, vol.44: pp.37-43, 96-102. 1 June, 1 Dec. 1947. Lists families and type genera, with bibliography and explanation. Changes 3 family names: Heliodinidae to Chrysoesthidae and Cochlidiidae to Apodidae on principle of naming families after first described genus, and Aptychiidae to Bradypodidae because of preoccupation of Aptychia. [P.B.]

232. Padmanabhan, S.Y., "Fusarium sp. Parasitic on Epipyrops, a Lepidopterous Parasite of the Sugarcane Pyrilla." Proc. Indian Acad. Sci., vol.26B: pp.77-92, 1 fig. Sept. 1947.

233. dos Passos, Cyril Franklin, and Lionel Paul Grey, "Systematic Catalogue of Speyeria (Lepidoptera, Nymphalidae) with Designations of Types and Fixations of Type Localities." Am. Mus. Novitates, no.1370: 30 pp. 12 Dec. 1947. [See review in Lep. News, vol.2: p.5.]

234. Petersen, Björn, "Die Geographische Variation einiger Fennoskandischer Lepidopteren" [In German, English summary]. Zool. Bidrag Uppsala, vol.26: pp.329-531, 6 pl., 43 maps, 13 figs. 1947. Statistical analysis of geographical variation of 16 spp. of Pieridae and Nymphalidae in Scandinavia, including many holarctic spp.; an extensive theoretical section deals with genetic and ecological control of variation, and racial evolution. An essential reference for students of butterfly geographical subspeciation. Important list of references given. [P.B.]

235. Pettey, F.W., "The Biological Control of Prickly Pears in South Africa." U. So. Africa Sci. Bull.271: 163 pp., 3 pls., 31 figs. 1947. Very detailed description of all stages and biology of Cactoblastis cactorum. Colored plate shows full view and details of all stages (including the 6 instars). Moth, imported successfully into Australia from South America to control cactus, also used in South Africa for good control. [C.R.]

236. Rymar, J., "Un nouveau groupe de composés organiques modifiant le dessin des ailes des Lépidoptères d'après la méthode d'injection de Zaćwilichowski" [In French]. Bull. Int. Acad. Polonaise, Cl. Sci. Math. Nat. BII 1947: pp.347-3 9, 2 pls. 1947. Effectiveness of injections of various substances in altering wing pattern in Vanessa urticae and some other Lepidoptera. [P.B.]

237. Schaffner, J.V., Jr., "Butterflies and Moths. Order Lepidoptera", pp.343-505, figs.69-127, in Craighead, F.C., "Insect Enemies of Eastern Forests", U.S. Dept. Agr. Misc. Publ., no.657. 1950. Includes key to larvae of very large number of spp. of Lepidoptera feeding on forest trees. Text gives, in phylogenetic sequence, brief descriptions and notes on food plants, habits, range, seasons of scores of spp., illustrated by good original photos, largely of larvae. [C.R.]

238. Sevastopulo, D.G., "Cage Birds and Insects." Entomologist, vol.80: pp.188-193. July 1947. Records of insects, mostly Lepidoptera, accepted and refused by the birds. [P.B.]

239. Simmonds, F.J., "The biology of Phytodietus pulcherrimus (Cress.) (Ichneumonidae, Triphoninae) Parasitic on Loxostege sticticalis L. in North America." Parasitol., vol.38:pp.150-156,16 figs. 24 July 1947.

240. Simmonds, F.J., "The Biology of the Parasites of Loxostege sticticalis, L., in North America - Meteorus loxostegei, Vier. (Braconidae, Meteorinae)." Bull. Ent. Res., vol.38: pp.373-379, 6 figs. 21 Aug. 1947.

241. Slabý, Otto, "Les espèces du genre Erebia Dalm. dans les Hautes Tatras. (Lep, Satyridae)." [In Czech and French]. Acta Soc. Ent. Čechosloveniae, vol.44: pp.102-119. 1 Dec. 1947. Describes as new E. pharte silbernageli; records 7 other forms. [P.B.]

242. Sotavalta, Olavi, "The Flight Tone (Wing-Stroke Frequency) of Insects." Acta Ent. Fennica, no.4: 117 pp., 18 figs. 8 Aug. 1947. Study includes normal frequencies and the effects of temperature and other factors. Frequency records are given for 136 spp. of Lepidoptera and many other insects. [P.B.]

243. Stehr, Gotthard, "Beziehungen zwischen der Blutzirkulation im Puppenflügel und dem Zeichnungsmuster von Ephestia kühniella" [In German]. Rev. Suisse Zool., vol.54: pp.573-608, 16 figs. Dec. 1947. Describes pattern of blood circulation in pupal wings. Attempts to demonstrate presence of active substances in the hemolymph affecting the wing pattern at specific times were not successful; concludes that substances in the wing epithelium are most important in pattern formation. Colchicine injections (used in an attempt to halt mitoses) had no effect. [P.B.]

244. Sutton, G.P., "Notes on Breeding Leucania vitellina (Lep. Agrotidae) in a Widely Fluctuating Temperature." Entomologist, vol.80: pp.159-160. July 1947. No apparent effect. [P.B.]

245. Webb, Damian, "A moth like a humming-bird." Country Life, vol.102: pp.876-877, 6 figs. 31 Oct. 1947. Fine figures of Macroglossum feeding. [P.B.]

246. Wojtusiak, Roman J., and Halina Wojtusiak, "Contributions to the knowledge of the lepidopterological fauna of Eastern Lithuania" [In Polish, English summary). Frag. Faun. Mus. Zool. Polonici, vol.5: pp. 159-183, 1 fig. 18 Dec. 1947. Brief ecological description of area studied, and annotated list of 299 spp. collected. [P.B.]

247. Tindale, Norman B., "A New Race of Tisiphone abeona Donovan (Lepidoptera Rhopalocera) from South Australia." Records S. Australian Mus., vol.8: pp. 613-617. 10 Dec. 1947. Describes as new T. a. antoni. [P.B.]

248. Travassos, Lauro, "Contribução ao Conhecimento dos 'Arctiidae' XIII. (Lepidoptera, Heterocera)" [In Spanish]. Rev. Brasil. Biol., vol.7: pp.335-340, 4 figs. Sept. 1947. Reviews Xanthophaeina (only sp. X. levis); both sexes, venation, genitalia and some other details are figured. [P.B.]

249. Travassos, Lauro, "Contribução ao Conhecimento dos 'Arctiidae' XIV. Gênero 'Euchlaenidia' Hampson, 1901" [In Spanish]. Rev. Brasil. Biol., vol.7: pp. 465-470, 6 figs. Dec. 1947. Discusses the genus and the Brazilian species E. transcisa; gives range of, and references to, the other two spp. [P.B.]

250. Troníček, Edvard, "Contribution à la connaissance de l'éspèce Sterrhopterys standfussi H.Schäf. (Lep. Psych.)" [In Czech, French summary]. Acta Soc. Ent. Čechosloveniae, vol.44: pp.135-143. 1 Dec. 1947. Systematics, range, biology and ecology. [P.B.]

251. Tweedie, M.W.F., "Back-to-front Butterflies." Pacific Discovery, vol.2: pp.18-19, 8 figs. Nov.-Dec. 1947. Well illustrated account of some Malaysian lycaenids whose long tails and eyespots simulate a head at the wrong end. [P.B.]

252. Tykač, Jaroslav, "Pieris brassicae L. gen aest. lepidii Rob. ab. obenbergeri n. ab." [In Czech, French summary]. Acta Soc. Ent. Čechosloveniae, vol.44: pp.119-120. 1 Dec. 1947.

253. Wolsky, Alexander, "Changes in the Response of Silkworm Eggs to Rotational Force during Cleavage." Nature, vol.165: pp.119-120. 21 Jan. 1950.

NOTICES BY MEMBERS

Disposing of periodicals in my private library. Journ.N.Y.Ent.Soc., vols.1-57 (complete, 1893-1949)-$100; Bull. Brooklyn Ent. Soc., vols.8-28 (1912-28)-$20; Papilio (all 4 vols., complete, bound) - $10; Psyche, vols.18-20 - $3; Can. Ent., vols.36-45(1906-13, 1 issue missing) - $7. W.P. Comstock, American Museum of Natural History, New York 24, N.Y.

Twenty thousand CALIFORNIA BUTTERFLIES for sale. Ten for $1.00; $5.00 per hundred. Perfect condition, named. Largest of all Morphos, the Amothonte, $1.00 ea. Price list free. Ben Karp, 3148 Foothill Blvd., La Crescenta, Calif.

SPEYERIA DIANA: Have a dozen males and three females for sale or trade. What do you have to offer? Stephen B. Smalley, 6129 Glade Ave., Cincinnati 30, Ohio.

Arizona species needed? Planning collecting trip this summer; will collect on order all families of Lepid. Prepared as desired: alive, pinned, papered.

* * *

Can also supply many southwestern species of Lepidoptera,(Rhopalocera, Heterocera),papered or pinned. Also LIVING MATERIAL. Inquiry invited. Frank P. Sala, 1764 Colorado Blvd., Los Angeles 41, Calif.

For sale: 4000 Unit Pinning Trays, balsa pinning bottom, white paper lined throughout, heavy caliber cardboard. Slightly defective. Standard sizes for Cornell or California Drawers. $1.00/dz. Free sample on request. Cornell and California Academy drawers now available with cabinets. Bio Metal Associates, P.O. Box 346, Beverly Hills, Calif.

Wish to exchange about 200 Manitoba moths, about 50 species, half named, full data. Desire exotic Rhopalocera, particularly Morpho. What offers for the lot? C.S. Quelch, Transcona, Manitoba, CANADA.

Lepidoptera from FLORIDA and WISCONSIN, a lot of over 2000 specimens, about 300 species, pinned and in papers. Want to sell the lot at bargain price. Send for list. Alex K. Wyatt, 5842 N. Kirby Ave., Chicago 30, Ill.

For exchange: Northwestern WASHINGTON MOTHS and BUTTERFLIES collected last season. Desire AUSTRALIAN or any tropical Lepidoptera. Mrs. Emily Henriksen, Orcas Island, East Sound, Washington.

For sale: Japanese Papilionidae, Pieridae, Nymphalidae, and Sphingidae with all correct data supplied. Listings sent on request. M.W. Osborne, 2100 Price St., Rahway, New Jersey.

Will exchange good used copy of Holland's MOTH BOOK for copy of revised ed. of BUTTERFLY BOOK in good used condition. L.H. Bridwell, Forestburg, Texas.

For exchange: The Spider Book, revised ed. Comstock; Hand Book of Frogs and Toads, Wright and Wright; The Grasshopper Book, Bronson; also Pennsylvania fossils. Desire Speyeria diana ♀♀ or Papilio ponceana ♀ or ♂ with data. J.A. Evey, Benson, Illinois.

Wanted: ENTOMOLOGICAL NEWS, vol.2: no.10; will purchase or will give other literature in exchange. Dr. C.L. Remington, Yale Univ., New Haven 11, Conn.

Wanted: Papered specimens of Pieris napi, P. bryoniae, and Papilio machaon from all parts of the world, esp. America and Asia, with full data and in perfect condition. Offered in exchange: Papered Macro-Lepidoptera from Germany, and if possible, breeding material. Gerhard Hesselbarth, Hindenburgstr. 13, (23) Diepholz/Hann., GERMANY.

European PARNASSIIDAE in papers (named, full data, Perfect condition) for sale or in exchange for North American Papilionidae and Parnassiidae in papers. Dr. W.J. Reinthal, University of Okla., Norman, Okla.

LIVING MATERIAL

Wish to arrange to obtain living ova, pupae, or cocoons of American Rhopalocera, Saturniidae, Sphingidae, Catocala. Offer in exchange similar material from Czechoslovakia, including Saturnia pyri, Thais polyxena, etc. in season, or papered butterflies. V.B. Poláček, ul. Komenského, 601/I., Brandýs nad Labem, CZECHOSLOVAKIA.

Would like to correspond in English or German with collectors interested in exchanging living Lepidoptera material — eggs and pupae. Johannes Reichel, Koenigsberg Krs. Wetzlar (16), GERMANY

New northern subspecies Eacles imperialis pini for sale, either hibernating pupae or male adults. Price of pupae or specimens: 3 for $1.00 postpaid. Elwyn Lewis, 384 E. Warren St., Flint, Michigan.

Have cocoons of wild Connecticut Samia walkeri ("Cynthia") to exchange for those of other Saturniidae. R.W. Pease, 57 Yale Station, New Haven 11, Conn.

Wanted to buy: rearing material in season - cocoons, pupae or eggs of Rhopalocera, Saturnioidea, Sphingidae, Arctiidae and Catocala. Write first quoting prices and naming food plants. Have Austrian pins for sale, best make (Trade Mark "Elephant"), rustproof, $4.00 per thousand. Eugene Dluhy, 3912 N. Hamilton Ave., Chicago 18, Ill.

Wanted: chrysalids of any North American Papilio in exchange for good European butterflies of Parnassiidae in papers (full data, exact names). Dr. W.J. Reinthal, University of Okla., Norman, Okla.

Cocoons or eggs of all species of American Saturniidae required. Will exchange living or preserved material of British Lepidoptera and/or Indian Saturniidae. Also willing to obtain books or other requirements of American supplier. C.F. Rivers, 250 Shepherds Lane, Dartford, Kent, ENGLAND.

Wanted for cash or exchange: living ova or pupae of Papilio machaon (Palaearctic), P. glaucus, Platysamia columbia nokomis, for hybridization and sterility experiments. Also need egg masses of Catocala relicta, and 200 living cocoons of Platysamia cecropia. D.P. Frechin, 1504 N. Lafayette, Bremerton, Wash.

QUESTIONS AND ANSWERS

Q. "Where can I go for original papers on subfamily and tribe classification for the Geometridae and Phalaenidae (Noctuidae), and why are Agrotidae and Plusiidae, used by some recent Europeans, considered families?"

A. Original of our present system of subfamilies in Noctuidae is Hampson's "Catalogue of the Lepidoptera Phalaenae" vol.4, p.3, 1903; the system for the Geometridae was developed gradually by Meyrick in papers on the Australasian region, and especially Trans. Ent. Soc. London, 1892: 53 ff. No system of tribes has been developed for the Noctuidae, and the only recent attempt for the Geometridae is my "Lepidoptera of New York" part 2, Cornell Memoir 274; 1948. Older divisions of these two groups into "families" (corresponding very roughly to modern tribes) are by Guenée in the "Hist. Nat. Ins. Lépid." (Suites à Buffon) 1852 - 7. The use of such names as Agrotidae and Plusiidae in place of Noctuidae is based on recent interpretations of the "Code of Nomenclature" extending its rules to groups above the genus. The general question of validity, meaning and application of the code is too large to discuss here. Personally I consider it to have never been validly established.

Q. "Can you give any advice for finding Callosamia angulifera? I live where promethea is very common and in the range of angulifera but have never found it."

A. C. angulifera feeds chiefly or only on tulip tree. The cocoon has no formed stem and so falls to the ground like polyphemus and may be found by raking and examining leaves, which is a tedious process.

Q. "Is it possible to identify the subfamily of noctuid caterpillars? I have looked at the book by Fracker and it does not divide noctuids by subfamilies."

A. Not with any precision. The only papers classifying Noctuid larvae as a whole are the series by Gardner in Trans. R. Ent. Soc. London, 96: pp.61-72; 97: pp.237-252; 98: pp.59-90; 99: pp.291-318; 1946-1948. They give subfamily characters so far as they can be recognized in the larvae, but our so-called "subfamilies" are probably largely arbitrary anyway. They apply to the Indian fauna, but the characters hold fairly well in our own so far as we have the same groups represented.

W.T.M. Forbes

An index to all the species of Lepidoptera mentioned in the first three volumes of the Lep. News is in preparation, with the initial compilation by D.T. McCabe. This index is intended to provide rapid reference to any species and should significantly increase the availability of material in the News. Of course, the "Recent Literature on Lepidoptera" and "Notices by Members" will not be included.

TABLE OF CONTENTS

ADDITIONS TO THE LIST OF MEMBERS

Amsel, H.G. (Dr.), (17b) Buchenberg bei Peterzell/Baden, GERMANY.
Gertsch, W.J. (Dr.), Dept. of Insects and Spiders, American Museum of Nat. Hist., New York 24, N.Y.
Hayes, Joseph B., 1905 N. Pulaski Rd., Chicago 39, Illinois.
Merriam, Elsey E. (Miss), 4520 Clarendon Ave., Chicago 40, Illinois.
Napier, Arthur H., 503 E. Willow Grove Ave., Chestnut Hill, Philadelphia 18, Pennsylvania.
Poláček, V.B., ul. Komenského, 601/I., Brandýs nad Labem, CZECHOSLOVAKIA.
Schwartz, Abel M., 6426 N. Campbell, Chicago 45, Ill.
Seydel, Charles, B.P. #712, Elisabethville, Belgian Congo, AFRICA.

CHANGES OF ADDRESS

Glick, P.A., Box 143, College Station, Texas.
Schryver, C.D., 4561 Wolff St., Denver 12, Colorado.

DECEASED

Berry, Dean F. Florida.

~-~

There is an urgent need for certain back numbers of The Lepidopterists' News to complete sets for sale to institutional libraries. Especially needed are:

Vol.I: nos.1,2,3,4,5
Vol.II: nos. 2,4,6
Vol.III: no.1

Members who are not preserving a complete file of the News and have no need for the above issues or any others in vols.I and II will be aiding in making the News better available for reference by presenting their copies to the Society. We gratefully acknowledge the gifts of early News issues already received.

THE LEPIDOPTERISTS' NEWS
Monthly periodical of The Lepidopterists' Society

Membership is open to all persons interested in any aspect of the study of butterflies and moths. The 1950 dues, including subscription to the NEWS, are $2.00 for Regular Membership and $4.00 for Sustaining Membership. Please make remittances payable to: C.L. Remington.

The Lepidopterists' News

THE MONTHLY PERIODICAL OF THE LEPIDOPTERISTS' SOCIETY

c/o Osborn Zoological Laboratory, Yale University, New Haven 11, Connecticut, U.S.A.

Editor - C. L. REMINGTON *Assoc. Editor* - J. E. REMINGTON

Volume IV 1950 Numbers 4-5

THE FIRST ANNUAL MEETING OF THE LEPIDOPTERISTS' SOCIETY

As discussed in a recent issue of the Lepidopterists' News (vol.4: p.1), definite steps have been taken this year to place the Society on a formally organized basis. Mr. Cyril F. dos Passos devoted a great amount of time to preparing a draft constitution and by-laws and modifying and amplifying the draft until a really notable document has been achieved. Mr. dos Passos then served as Chairman of the international Organization Committee which studied, amended, and approved the draft and which appointed temporary officers to serve the Society until the Constitution could be formally adopted and elections held. The final report of the Organization Committee will be found on the next page.

The President pro tem., Dr. J.H. McDunnough, appointed three temporary committees, as follows, to prepare for the first annual meeting:

PROGRAM COMMITTEE

William D. Field (Washington, D.C.)
Sidney A. Hessel (New York)
Roger E. Richard (Michigan)
C.L. Remington (Connecticut), Chairman

COMMITTEE ON LOCAL ARRANGEMENTS

R.C. Casselberry (New York)
William P. Comstock (New Jersey)
Rowland R. McElvare (New York)
George W. Rawson (New Jersey)
A. Barrett Klots (New York), Chairman

NOMINATING COMMITTEE

Ralph W. Macy (Oregon)
Eugene G. Munroe (Ontario)
Walter R. Sweadner (Pennsylvania)
C.B. Williams (England)
C.L. Remington (Connecticut), Chairman

The site chosen for this first meeting is New York City and the dates are December 29th-30th,1950. New York gives promise of the largest possible attendance because of the concentration of Society members within 100 miles of the city. Furthermore, the American Museum of Natural History has ideal facilities for such a meeting, and the authorities of the Museum have very kindly made them available to the Society. The dates chosen seem to be the only ones when nearly everyone who might attend the meeting can get away from his place of vocation; they are long enough after Christmas and enough before New Year's Eve to avoid interference. Future meetings will be held in other parts of North America and possibly in other Continents.

The general program for the meeting will be as follows:

Friday, December 29th

Morning - Paper-reading Session
Afternoon - Symposium
Evening - Illustrations Session

Saturday, December 30th

Morning - Paper-reading Session
Afternoon - Annual Business Meeting

Any member who will be attending the meetings may present reports of research, field observations, and technique developments at either of the paper-reading sessions, with a limit of 15 minutes on each paper "read". Mr. Field is in charge of this part of the program.

The Symposium will have as its general title, "Geographical Subspeciation in Lepidoptera". There will be a discussion leader and five invited speakers, each analyzing one aspect of the subject.

The Illustrations Session will include a salon of large photographs and drawings and an hour or two of projection of kodachrome slides and perhaps color-movies. All Society members may send material for this session. Mr. Richard is in charge.

There will also be an exhibition of specimens, equipment, and other material submitted by members. It will be on view in the Museum throughout the two-day period. The exhibition is under the direction of Mr. Hessel.

The primary matters for action at the Business Meeting are: 1) adoption of the Constitution and By-Laws; 2) election of officers for 1951; and 3) reports of committees and certain officers.

Prospects are already excellent for a large turn-out for the meetings, with some members planning to come from a considerable distance. We believe that all the sessions will be both valuable and entertaining. The contact with so many fellow enthusiasts is, of course, a chief attraction.

C.L. Remington

THE LEPIDOPTERISTS' SOCIETY

REPORT OF THE ORGANIZATION COMMITTEE

1. On the 31st day of July, 1950, Dr. Charles L. Remington, one of the founders of The Lepidopterists' Society and Editor of The Lepidopterists' News, appointed a Committee consisting of the following members of the Society to prepare and adopt a Constitution and By-Laws for the Society:

Cyril F. dos Passos, Chairman (U.S.A.)
Don B. Stallings, Secretary (U.S.A.)
Axel Andersen (Denmark)
Jean Bourgogne (France)
Harry K. Clench (U.S.A.)
John G. Franclemont (U.S.A.)
T.N. Freeman (Canada)
Lloyd M. Martin (U.S.A.)
Yoshio Okada (Japan)
Lauro Travassos F° (Brazil)
C.B. Williams (England)

2. The Organization Committee has considered the draft of a proposed Constitution and By-Laws, prepared by its Chairman in consultation with Dr. Remington, and a number of members of the Committee have made valuable suggestions for the improvement thereof. These suggestions all have been carefully considered and many of them adopted. In view of the distances separating most members of the Committee, it has not been possible to hold any meeting.

3. As a result of the foregoing, the Organization Committee hereby adopts the Constitution and By-Laws hereto annexed, made a part hereof and marked Exhibit A, as the Constitution and By-Laws of The Lepidopterists' Society, and recommends that the same be submitted to the annual meeting of the Society to be held at the American Museum of Natural History on the 30th day of December, 1950, for ratification and approval.

4. The Organization Committee, by virtue of the authority conferred upon it, nominates and appoints the following temporary officers of The Lepidopterists' Society to serve as such until their successors are duly elected:

President	Dr. James H. McDunnough
Secretary	Dr. Frederick H. Rindge
Treasurer	Dr. J. Benjamin Ziegler

Respectfully submitted,

Dated October 1, 1950

(signed)	(signed)
Don B. Stallings	Cyril F. dos Passos
Secretary	Chairman

[Mr. Austin H. Clark accepted appointment as Vice-President pro tem. on October 27th and will preside at the Business Meeting in New York in the event that the President is unable to attend the meetings.]

NOMINATIONS FOR 1951 OFFICERS

Voting for officers will be by mail ballot by all members who will not be present at the meeting and it is hoped that every member will vote, although the ballot this year includes only one nominee for each office. The Constitution provides for additional nominations by petition from ten or more members, and this system will be in operation for each election after this first one. A shortage of time forced the single nominee system to be used exclusively, but every effort was made to have the ballot fully representative geographically, taxonomically, and with both amateur and professional lepidopterists.

The Nominating Committee submitted the following list, which has been placed on the ballot and mailed to all Society members by the Secretary:

OFFICERS

President (term - one year):
J.H. McDunnough (U.S.A.)

Senior Vice-President (one year):
Austin H. Clark (U.S.A.)

Vice-President (one year):
Walter Forster (Germany)

Vice-President (one year):
K.J. Hayward (Argentina)

Secretary (two years):
Frederick H. Rindge (U.S.A.)

Treasurer (two years):
J. Benjamin Ziegler (U.S.A.)

EXECUTIVE COMMITTEE

One-year term	Thomas N. Freeman (Canada)
	Henri Stempffer (France)
Two-year term	Lloyd M. Martin (U.S.A.)
	N.D. Riley (Great Britain)
Three-year term	John G. Franclemont (U.S.A.)
	Takashi Shirozu (Japan)

After adoption of the Constitution and By-Laws a copy will be sent to each Society member. The Constitution provides for a thirteen-man Executive Committee to control the affairs of the Society. The Committee is composed of the six officers, the Editor-in-Chief, and six other elected members two of whom shall be replaced each year. The Executive Committee will carry out its functions by correspondence and by a meeting at the time of the Annual Meeting.

THE AMERICAN PAPILIOS

by F. Martin Brown
Colorado Springs, Colorado

Many collectors of tropical butterflies tend to specialize in one or two groups of the more beautifully patterned species. Among these the Papilios stand high as favorites. Very few of the collectors have at hand the library facilities to determine their specimens and must depend upon the identification supplied by the dealer. An unfortunate number of such specimens are incorrectly named.

Perhaps the greatest deterrent to accurate determinations among the American Papilios is the large number of species that mimic one another. Several members of the Lepidopterists' Society have written to me and asked questions that indicate that some notes about the identification of the groups into which the American Papilios are divided may be of use to a rather wide circle of members.

Many attempts have been made to divide the blanket genus Papilio into less cumbersome genera. None of these attempts really has been successful. The prime reason for most of the failures has been the attempt to work with adequate material from only one faunal area. Until someone with an extensive world-wide collection, a complete library, and a lot of time attacks the problem we will have to continue using Papilio as a very heterogeneous "genus".

Serious students of the American Papilios base their studies on the classic work of Rothschild and Jordan published in 1906. For the amateur this work is not particularly satisfactory since it contains so few illustrations. A better reference that is adequately illustrated is the volume of Seitz' Macrolepidoptera of the World devoted to the American fauna. The section on Papilio for this was prepared by Dr. Jordan. But with no keys and very sketchy descriptions "Seitz" is often more confusing than illuminating, particularly among the groups that resemble each other.

To supplement "Seitz", in this and succeeding articles I will present keys and notes that may make the determination of the American Papilios a little more easy and certain. The keys are in part my own and in part are copied from Rothschild and Jordan. All conform with the exhaustive research done by those two men.

The three major sections of the Papilios are: the ARISTOLOCHIA-Papilios, the FLUTED-Papilios and the KITE-Papilios. To a practiced eye the typical species of each are easily recognized. North American representatives of the three groups are respectively, philenor, ajax, and marcellus. In the tropics the three sections are not so clearly distinct because of mimicry. By far the most reliable clues to the sections are found in the immature stages. However, these are of little use when only the imago is at hand. They do support and give value to what may otherwise seem insignificant structural differences used in the keys. Some of these differences are not easy to see and must be sought carefully under a lens. There are a few outstanding characteristics that will immediately assign some species to the proper section. The males of the ARISTOLOCHIA section often can be spotted by the wooly sex-patch along the abdominal margin of the hindwings. This "wooly" condition does occur on some males of the KITES. These can be recognized by the anastomosed radial-one nervule. The fluted fold on the abdominal margin of the hindwings of both sexes of the FLUTED section is easily seen and is its key characteristic. Those of the KITE section that bear the characteristic long slender, non-spatulate tails are easily recognized but unfortunately many of the species in this group so closely mimic members of the other sections that the majority of KITES must be recognized by other characteristics. Some of the KITES are the Papilios upon which the first or first and second radial nervule is fused with the subcostal nervule. This does not happen in any other group.

It is necessary to include in this short discussion of the grouping of American Papilios a few words about the generic names that might be used with them. Hemming (1934) lists 34 names of generic rank that were applied to fractions of the giant genus Papilio previous to 1864. I have no idea how many have been proposed since but do know that the number is not small. Since Hemming is planning to discuss the generic names published since the close of 1863 it is best to await his diagnosis of the recent names before any attempt is made to fix generic names for the subdivisions of the blanket genus.

The basis for Rothschild and Jordan's analysis of the groupings seems to me adequate for further studies. This basis is not restricted to any one feature but involves the whole insect. It in turn is an elaboration of Horsfield's studies reported in the Catalogue of Lepidopterous Insects in the Museum of the East India Company published in 1857.

I think that there is little quarrel with the segregation into three major divisions. If these divisions be considered of generic rank then the names available for them are these:

ARISTOLOCHIA Papilios	:	Battus Scopoli 1777
FLUTED Papilios	:	Papilio Linné 1758
KITE Papilios	:	Graphium Scopoli 1777

Beyond this division I am loath to go. I am sure that there are groups within the three major divisions that rise at least close to generic stature as do the Bird-Papilios of the Indo-Australian region. These are recognized as Troides Hübner.

The following structural key will separate the three sections one from the other if care is taken. I would suggest that the characters used be compared for the three well-known species that are North American representatives of the sections. This will give an idea of what is to be sought.

STRUCTURAL KEY TO THE SECTIONS OF PAPILIO

1. Spines on the tarsi: outer ventral row of four rows of spines not separated from the spines of the dorsal surface by a sharply defined, spineless, depressed space .....ARISTOLOCHIA

   Spines on the tarsi: outer ventral row of four rows separated from the dorsal spines by a spineless depressed space 2

2. Abdominal margin of hindwings curved downward, having appearance of being fluted when viewed from beneath; ♂♂ without a distinct scent-patch .....FLUTED

   Abdominal margin of hindwings not curved downward; on ♂♂ this margin is widened and usually bears a scent-patch .....KITES

These characters will separate the Papilios from any faunal region into the three accepted sections.

SECTION I - The ARISTOLOCHIA Papilios

This section of the Papilios is absent from Africa, except the island of Madagascar where one species flies. It is particularly abundant in the American tropics and in the Oriental and Indo-Australian regions. The Old World insects are separable from those of the New World on a structural basis. It is possible that this difference will be found of no value for generic purposes when a thorough study has been made. On the other hand investigation may prove that none of the Old World genera of the ARISTOLOCHIA Papilios fly in the Americas and vice versa.

The American ARISTOLOCHIAS are subdivided among two subsections, A and B. Whether or not these subdivisions are of generic, sub-generic, or super-generic value has not yet been clearly established. The characters given in the following key will separate the two subsections.

Antennae with sharply defined sensory grooves; ♂ sense organ wooly or densely scaled, no naked streak at its discal side; ♀♀ with anal segment adorned with numerous hairs and bristles; claws asymmetrical; body marking bright red .....SUBSECTION A

Antennae without distinct grooves; ♂ scent-patch never wooly, a naked streak on the discal side of the fold; ♀ anal segment with some short spinelike bristles; claws of at least the hind legs symmetrical; body markings not bright red, at most rufous, usually yellow or white; no red spot or band in center of hindwings, submarginal spots always present .....SUBSECTION B

SUBSECTION A OF THE ARISTOLOCHIA PAPILIOS

The following is the description of this subsection as set forth by Rothschild and Jordan with the nomenclature of the nervules changed from their system to the more widely used Comstock-Needham system.

"Antennae long; club slender; sensory groove more or less large, sharply defined; end segment conical, almost as long as broad. Claws asymmetrical. Markings of body red. Hindwing usually with red band or row of red spots on disc, these markings seldom white or yellowish white. Forewing of female bearing often white or yellowish white patches on disc and in cell, being sometimes all black. Cu_2-A_1 cellule long, widening distally; precostal curved near its base. Disco-cellular nervules of forewings oblique; upper angle of cell obtuse. Cell of the hindwing more or less acuminate, D_3 (ldc) more or less leaning based anteriorly, the cell-angle at ldc-Cu_s being smaller than angle mdc-ldc, or ldc reduced to a point, rarely transverse, never leaning distad.

"Male. Scent-organ wooly or densely scaled, no naked streak at its discal side. Tenth abdominal sternite not reaching to the apex of the long slender tergite. Tibiae often incrassate and hairy.

"Females. Anal segment with numerous hairs and bristles which are mostly tapering to a fine point, others ending abruptly, being somewhat thicker at the tip than at the base; in many species there are some bristles which are distinctly club-shaped."

The subsection A can be conveniently divided into three groups of species according to the artificial key presented by Rothschild and Jordan and based upon the pattern. I have slightly modified the form of this key from that in their publication.

1. Fringe-spots red; palpus always black .....
   .....LYSANDER Group (III)

   Fringe spots white 2

2. Hindwing with submarginal spots and usually also discal spots or dots, or a discal band; mostly with tail .....ASCANIUS Group (I)

   Hindwing without submarginal spots but with discal band or row of spots ....AENEAS Group (II)

I. ASCANIUS Group

The pattern of these ARISTOLOCHIAS is believed to represent the more ancestral type. The distribution is interesting in that it is more or less restricted to the northern and southern fringes of the Neotropics. The only species in the group that is found in the equatorial regions is phalaecus, the one spatulate-tailed ARISTOLOCHIA in the region. P. gundlachianus (columbus H.-S.), found on Cuba, is believed to have the most ancestral pattern of all the American ARISTOLOCHIAS.

There are 11 or 12 species in this group. Those from the northern areas are:

Cuba: gundlachianus Felder
Mexico and Central America: photinus Doubleday, alopius Godman and Salvin, montezuma Westwood.
Central America: dares Hewitson.

The single mid-tropical species is phalaecus Hewitson from eastern Ecuador.

The species found in the southern part of the range are:

Brazil, Paraguay, Uruguay, and the Argentine: agavus Drury, and perrhebus Boisduval.
Southeastern Brazil: ascanius, proneus Hübner, and chamissonia Eschscholtz.

II. AENEAS Group

In this, the largest group of the ARISTOLOCHIA Papilios, many of the species are deceptively alike. Rothschild and Jordan give this advice: "if some attention is paid to the structure of the tibiae of the males, the colour of the palpi of both sexes, the extent of red at the tip of the abdomen of the females, and the shape of the apex of the cell of the hindwing, the reader will generally be able to identify the species and mate the sexes correctly."

There are thirty-five or more species of Papilio in the Americas that can be referred to this group. All of them are found in the Neotropics. Some are very widely spread and have broken into many geographic races, others are known from very limited areas. Many are rare in collections, other are the most abundant Papilio of the particular region being collected. I have found that both the common and rare species in a region usually have the same habits and thus there is a real difference in the abundance of each. The greatest number of species is known from the northwestern part of South America and the Amazon valley. There are no Antillean members of this group. Only two species are really very wide spread. P. sesostris Cramer is found throughout Central America and northern South America and anchises Linné pretty much throughout South America. The others are distributed as follows:

Mexico: polyzelus Felder and iphidamus Fabricius.
Central America: childrenae Gray, lycimenes Boisduval, erithalion Boisduval, polyzelus Felder, and iphidamus.
Northwestern South America: aeneas Linné, childrenae, erlaces Gray, phosphorus Bates, vertumnus Cramer, lycemenes Boisduval, erithalion, iphidamus.
Northeastern South America: triopas Godart, coelus Boisduval, klagesi Ehrmann, aeneas Linné, phosphorus, vertumnus.
Amazon Basin: chabrias Hewitson, quadratus Staudinger, pizzaro Staudinger, aeneas, orellana Hewitson, burchellanus Westwood, drucei Butler, cutorina Staudinger, phosphorus, vertumnus.
Southwestern South America: steinbachi Rothschild, aeneas, erlaces, drucei, vertumnus.
Southeastern South America: hahneli Staudinger, dardanus Fabricius, erlaces, hedae Foetterle, nephalion Godart.

III. LYSANDER Group

There are only eight or nine species in this group. The species are not too difficult to determine. The group is easily spotted by the red marginal spots. The bulk of the species is found to the north of the Amazon but some occur throughout the southern parts of the Neotropics. There are no Antillean species and only one is found in Mexico and Central America. The ranges of the eight species noted by Rothschild and Jordan are as follows:

panthonus Cramer - the Guianas and Brazil.
aglaope Gray - the lower Amazon, southeastern Peru, and northeastern Bolivia.
lysander Cramer - the Guianas and entire Amazon Basin.
echemon Hübner - the Guianas and lower and middle Amazon Basin.
neophilus Hübner - all of tropical South America except west of the Andes and in the mountains of southern Brazil.
zacynthus Fabricius - east coast of southern Brazil.
arcas Cramer - Mexico to northern South America.
timias Gray - western Ecuador.

SUBSECTION B OF THE ARISTOLOCHIA PAPILIOS

There are far fewer members to this section than to the preceding section of the ARISTOLOCHIAS. The members of Subsection B are much more alike in structure and therefore are placed in a single group. A quick separation of the two subsections can be based upon the color of the spots on the body. All of those with white or yellow belong to Subsection B. Those species with rufous spots on the body cause the most trouble. The appearance of a red basal spot on the underside of the hindwing of a specimen suspected of being a Subsection B species places it certainly in Subsection B.

There are fourteen or fifteen species in the subsection, or Polydamus-group, as it is called. The two ARISTOLOCHIA species commonly found in the Nearctic Region belong in this subsection. Only three species in the subsection bear tails; philenor, devilliers, and zetes. Of these the first contains races that are practically tailless. A larger part of the species of this subsection range into the temperate areas of the Americas than of subsection A. The majority of the species in this group are found on the older land masses of the Americas. They are less common in the Amazon Basin than are the members of the preceding subsection. The species that are met with in the various areas of the American faunal regions are as follows:

United States: philenor Linné and polydamus Linné.
Mexico: philenor, polydamus, eracon Godman and Salvin, belus Cramer, laodamus Felder, crassus Cramer.
Antilles: devilliers Godart, zetes Westwood, polydamus.
Central America: polydamus, belus, laodamus, lycides Cramer, crassus.
Northwestern South America: polydamus, belus, laodamus, lycides, crassus.
Amazon Basin: streckerianus Honrath, polydamus, phileta Hewitson, belus, lycides, crassus.
Southwestern South America: polydamus, lycides, crassus, archidamus Boisduval, madyes Doubleday, belus.
Southeastern South America: polydamus, polystictus Butler, crassus (?).

(To be continued.)

Review of "THE BUTTERFLIES OF GEORGIA, REVISED" by Lucien Harris, Jr.

The original edition of this annotated check-list was issued in 1931 as Bulletin No.1 of the Georgia Society of Naturalists and is out of print. Not having a copy of the 1931 edition available, we are unable to indicate the extent of revising in the copy at hand. It was issued as the Society's Bulletin No.5. There is a brief and significant Foreword by Austin H. Clark, the most active student of butterfly faunistics for the southeastern states. Mr. Clark also prepared a thorough bibliography for the new check-list. Mr. Harris acknowledges also the nomenclatural assistance of Mr. Clark.

Any consideration of Georgia Lepidoptera must concern itself with the work of the superb 18th Century naturalist, John Abbot. Mr. Harris has devoted about one-half of his Introduction to a summary of Abbot's contributions, and he has made extensive use of Abbot's notes on biology throughout the text. In fact, the absence of life history observations more recent than 1797 is the most regrettable lack in the new Harris check-list.

The body of the publication is in the form of a list of the butterflies known or suspected from Georgia, with records of localities and dates of capture, etc. The nomenclature is in line with the newest specialized publications, with such names as Battus for philenor and polydamas, Precis evarete coenia in place of Junonia coenia, and Limenitis in place of Basilarchia. Some of the determinations, particularly in Phyciodes, appear doubtful to the reviewer.

While the latin nomenclature is current and precise, the treatment of infra-specific categories is neither clear nor consistent. Local lists like this one are of general interest primarily for geographic investigations. Therefore it is important that the geographic concept of the subspecies be very carefully applied. In the present list one finds such puzzling records as subspecies flora flying with subspecies clyton of Asterocampa clyton and egeremet flying with typical race otho of Wallengrenia otho. The terminology of non-geographic forms is also indefinite and perhaps reflects the muddled treatment encountered so widely in the current literature. Form smilacis of Mitoura gryneus, clearly a seasonal form name for the second brood, is reported occurring "with the regular form on July 17, 1929". "Subspecies flavida" of Anthocharis midea is of course not a subspecies in the modern sense and is probably a genetic form like the white female form of Colias spp. These rather technical lapses detract little from the usefulness of the list.

Collectors in the Southeast will find "The Butterflies of Georgia" an often consulted reference and for students of geographic distribution it will be a valuable source of data. It is mimeographed clearly and cleanly. The price is $1.00 and the publication may be obtained from the author: Mr. Lucien Harris, Jr., President, Georgia Society of Naturalists, 61 Clarendon Ave., Avondale Estates, Georgia.

C.L. Remington

Review of "A NEW SPECIES OF MITOURA SCUDDER FROM THE PINE BARRENS OF NEW JERSEY", by Rawson and Ziegler

The discovery reported in this paper is so remarkable and yet a kind of discovery so possible for every assiduous field lepidopterist that it deserves special recognition beyond the abstract under "Recent Literature on Lepidoptera" (see p.58).

For many years no STRIKINGLY different new species of butterfly has been found in the eastern U.S.A. except in northern Maine. It seems certain that every species has now been reported, with the exception of the hidden, or "Sibling Species". In fact, the reviewer ventures to predict that no new species of butterflies except Siblings will be discovered in North America or western Europe and few in any other part of the world; most new "species" these days are soon shown to be subspecies or less. A few years ago the discovery in the East of Strymon larvae on Hickory (Carya) by Dr. J.H. McDunnough led him to suspect a species difference and he soon discovered his new S. caryaevorus, which flies with S. falacer Godt. but is exceedingly difficult to distinguish from it except by ♂ genitalia.

"Sibling [from sibb = related] species" may be defined as two or more species which occur in the same range (in part or wholly) and which are almost indistinguishable to the unaided eye. They usually have important differences in their biology and do not tend to inter-mate. The recognition of a new sibling species is a high taxonomic achievement. In butterflies these concealed new species will doubtless be discovered occasionally for many years. Usually they are first noticed because they occur in an unusual environment and feed on a surprising foodplant. In some cases, like the Phyciodes batesii and P. tharos siblings, the flight periods are different. The two most exciting recent examples of new sibling species are Colias "alfacariensis" (sibling with C. hyale) of northwestern Europe and Mitoura hesseli of the East Coast of the U.S.A.

Drs. Rawson and Ziegler and their companion, S.A. Hessel, discovered M. hesseli at Lakehurst, New Jersey, for fifty years or more one of the most heavily collected localities in North America. Its invariable proximity to White Cedar (Chamaecyparis) in localities where Red Cedar (Juniperus) does not grow was the clue that led to the recognition of the new species. The common M. gryneus is not known to feed on anything except Juniperus and never wanders far from it. Slight differences in the habits of the adults are reported. The color pattern on the wings and the ♂ genitalia have small but dependable differences. Excellent photographs show the upper and under sides of both sexes of M. gryneus Hbn. (= damon Cram.) and of the types of M. hesseli. There are also drawings of the ♂ genitalia of hesseli and gryneus. In addition to the biological notes and thorough description of hesseli, the authors have outlined clearly all the known points of distinction between hesseli and gryneus. This fine paper will be followed soon by the description of the life-history of hesseli, which the authors have reared simultaneously with gryneus.

C.L. Remington

SOME RECORDS OF BUTTERFLY MIGRATION IN JAPAN AND KOREA

by Tarō Iwase
Kamakura, Japan

The following records of butterfly migration are compiled from the articles published in the Japanese magazine "Zephyrus", edited by Dr. Teiso Esaki, Fukuoka, Japan.

(1) "An enormous swarm of Parnara guttata (the Rice-plant Skipper) attacked Osaka city", by Nobuyoshi Tozawa. Zephyrus, vol.2: p.272; 1930.

On August 21, 1930, at 11 a.m., an enormous swarm of Parnara guttata Bremer and Grey (a smaller but near ally of the North American Calpodes ethlius), flying from east to west, attacked Osaka, the second largest city in Japan. They collided with office windows, cars on streets, and pedestrians, and the dead skippers were left on the scene. On the same afternoon at 3, Mr. Y. Matsuda, a veteran collector, observed a similar swarm resting on the water off Tarumi, 25 miles west of Osaka, while he was angling on a boat. It was reported also that on that morning the same skippers flew across Lake Biwa from north to south over Ishiyama railway station, Shiga-ken, 30 miles northeast of Osaka. The weather was cloudy with local thunder storms and the temperature dropped occasionally. Further, on August 25, a flight of the same skippers was noticed at Kishiwada, 15 miles southwest of Osaka. Mr. Tozawa suggested that there must be some relation between mass flight and the water damage caused by a heavy rain around July 30 in the Kyoto-Osaka-Kobe area.

(2) "An over 300 years old record of butterfly migration in Korea", by Dr. Tamezo Mori. Zephyrus, vol.3: p.279; 1931.

On July 20, 1617, white butterflies flew in a swarm from Manchuria (from northeast to south) over Kozan (Kop-San?) in Kankyo Nan-do. They were observed like a huge dragon and continued over three days. Afterward they appeared over Hokusei (near Zokko), 55 miles south of Kozan, in two days long and flew away southward to the Japan Sea. Mr. Mori commented that these whites might be Pieris rapae L., but I would rather venture to take them for Pontia daplidice L. There are many recent records of occasional capture of the Bath White (Pontia) in Japan, just in the direction across the Japan Sea. For instance, 1 ♀ Pontia taken on October 23, 1929, in Fukuoka; 2 ♂♂ and 3 ♀♀ in May and June 1940 in the same locality; 1 ♂ captured in September 1939 in Shimane-ken, and another specimen reported from Yamaguchi-city. All localities are within a radius of about 450 miles from the southern shore of Kankyo Nan-do, Korea.

(3) "An extraordinary abundance of the Snout-butterflies (Libythea celtis celtoides Fruhstorfer) in Mino-o", by Kozo Hirose. Zephyrus, vol.1: pp.120-121; 1929.

On June 2, 1929, Mr. Hirose observed a great many snout-butterflies in Mino-o Park near Osaka. They were all hibernators. Three weeks after that he met with an extraordinarily large swarm of them on June 23 in the same place. They were almost all newly emerged ones, and literally covered the foliage and ground like so many fallen leaves. On June 30, there was still a very large mass of Libythea, but less than a week before. Mr. Hirose reminded us that Dr. T. Esaki had also reported the same phenomena in June 1917 in Mino-o and Osaka. No relation to migratory flight was suggested, but these instances are worthy of note.

There are some other records of butterfly migration in Japan, e.g., those reported by Mr. H.S Pryer, but, to my regret, I have no available references now at hand. These await another occasion. Migration of the Long-tailed Blue (Lampides boeticus L.) has been eagerly sought here by my sponsorship since 1941, but no definite conclusion has been brought up to now.

NOTES AND RANGE EXTENSIONS OF BUTTERFLIES IN GEORGIA

by Lucien Harris, Jr.
Atlanta, Georgia

Euphydryas phaeton Drury. A fresh specimen of the Baltimore was taken near a small stream and boggy area at the base of Stone Mountain on June 17, 1950, by Lucien Harris, III. This apparently represents the southern limit of its range. About fifty years ago a small colony was found in north Georgia near Adairsville. Since then only two ragged and flown stray specimens have been observed, one by Eugene Smith near Madras and another by H.F. Strohecker near Macon.

Phyciodes ismeria Bdv. and Lec. Several males were taken on Old Fort Mountain near Chatsworth on May 2, 1950. Two weeks later on May 16 the females were fairly common. Specimens taken on both dates were sent to Mr. A.H. Clark. He reported that these specimens agree well with others from the West, from Texas to southern Canada. Boisduval and Leconte's figures are so poor as to be practically unrecognizable but there is no other species from Georgia that they could represent. Mr. William D. Field, who al-

so studied the question, agrees that these specimens undoubtedly represent Boisduval and Leconte's ismeria.

Asterocampa clyton flora Edw. Fairly common in Augusta where Henry Eustis takes them feeding on ripe figs. Only one stray specimen was previously known from the State.

Hesperia metea Scudder. New State record. Collected by Eugene Smith in Coweta County in April of 1949 and 1950; also collected by Lucien Harris, III, on Old Fort Mountain May 16, 1950.

Hesperia meskei Edw. New State record. A pair collected by Lucien Harris, III, in Atlanta on June 13, 1937; also collected by Eugene Smith in Coweta County on June 14, 1949.

Problema bulenta Bdv. and Lec. This species, lost since the days of John Abbot, was rediscovered by Frank Morton Jones who collected five specimens near Wilmington, North Carolina, in July 1925. The writer has taken two specimens in Georgia, one male on June 15, 1945, and a female on May 7, 1950. The male was presented to the United States National Museum so that genitalic studies might be made.

Poanes aaroni Skinner [= howardi Skinner]. Occurs at Augusta, which is rather surprising as it is nearly one hundred miles from the coastal salt marshes. It has been collected several times by Henry Eustis and his Augusta specimens were examined by Mr. Clark and the identification confirmed.

Amblyscirtes belli Freeman. This new record for Georgia and the East was collected on May 14 and 17, 1941, in Augusta by Eustis and again on June 25, 1945. One specimen taken in Atlanta on June 3, 1941, by P.W. Fattig, of Emory University, was identified by Mr. Clark, who found it in the United States National Museum series of A. alternata. He also confirmed the identification of the Augusta specimens.

Amblyscirtes carolina Skinner. A specimen collected on May 10, 1946, by Eugene Smith at Madras and identified by Dr. Ralph L. Chermock of the University of Alabama is of special interest, as the only other Georgia specimen is one in the Academy of Natural Sciences of Philadelphia taken in Atlanta about 1910 by W.F. Fiske and determined by Dr. Skinner.

Atrytonopsis hianna Scudder. New record for Georgia. First collected by Eugene Smith in Coweta County in 1949 with the earliest date of capture being April 15th. Collected near the summit of Old Fort Mountain by Lucien Harris, III, and south Georgia in Grady County by the writer on May 6, 1950.

THE OCCURRENCE OF A BUTTERFLY IN THE PRIBILOF ISLANDS

by Eugene Munroe
Division of Entomology
Department of Agriculture
Ottawa, Canada

Johnston (Lep. News, vol.4: p.28) states that there is no record of the capture of any butterfly in the Pribilof Islands. The following note may therefore be of interest.

There is in the Redpath Museum, McGill University, Montreal, in the collection of the late Mr. A.R. M. Boulton, a pair of Pieris napi L., the male of which is labelled as follows:

Pieris v. hulda
Pribilof Island
Behring Sea
Alaska
♂ VII - 24 - 1914

The label of the female is similar except for the sex symbol and the date, which is "VII - 25 - 1914".

The specimens are of the dark arctic type, and are not very different from those taken at Dawson, Yukon Territory. Not having examined them recently, I cannot give a more detailed description.

The labels seem sufficiently circumstantial to exclude doubt as to the authenticity of the locality record. There is unfortunately no indication of the collector's name, or of the particular island on which the specimens were collected. There is no other material from the Pribilof Islands in the Boulton Collection.

It will be seen that the dates of capture fall within the season of Mr. Johnston's annual visits. The fact that he did not encounter the butterfly in eight years of collecting on both the principal islands suggests that the species, which is conspicuous and would not easily be overlooked, no longer exists on the Pribilofs, although it was apparently present in 1914. It is interesting and satisfying, however, to note that Pieris napi is the butterfly mentioned by Mr. Johnston as the one most likely to occur there.

I wish to thank Mr. George A. Moore, curator of the Lyman Entomological Room at the Redpath Museum, who was kind enough to look up for me the details of the specimen, of which I had only a bare locality record.

SOME NOTES ON DANAUS PLEXIPPUS IN 1949

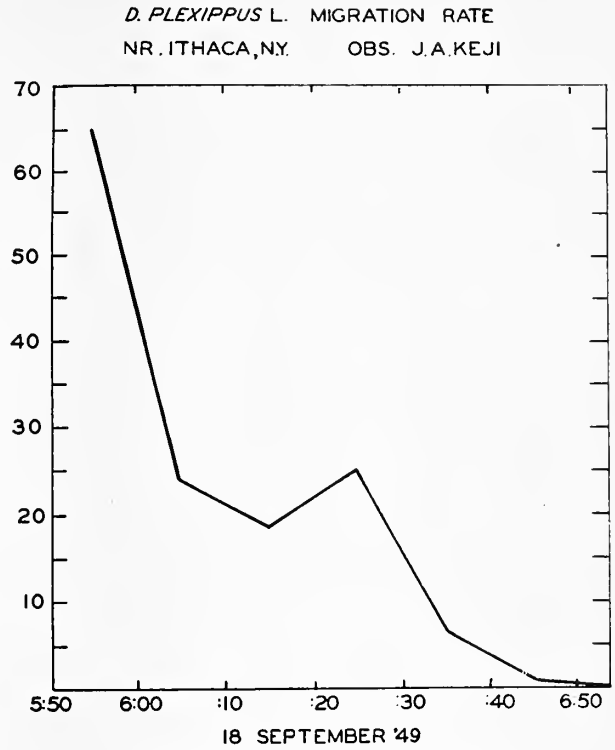
by F. Martin Brown
Colorado Springs, Colorado

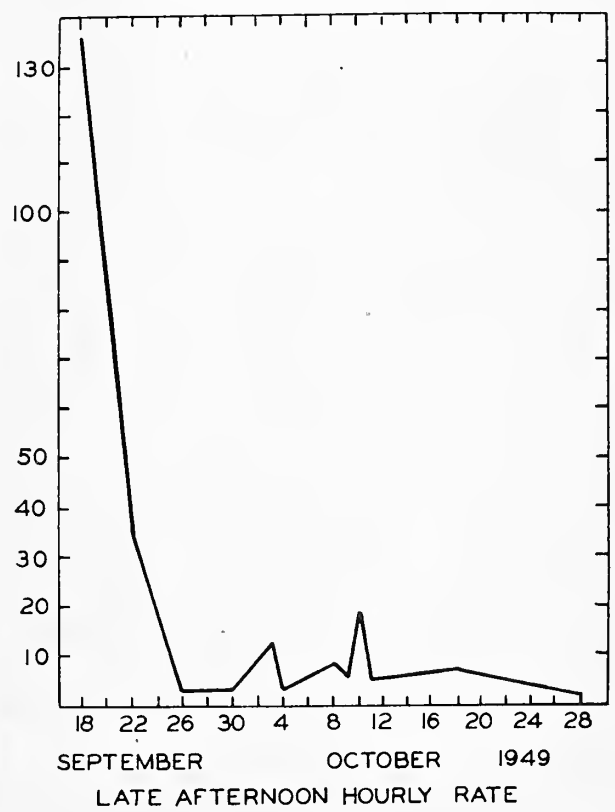
In October I asked the collaborators for THE NEARCTIC BUTTERFLIES to send me supplementary notes about the Monarch (Danaus plexippus L.) in 1949, especially any data on the year's migrations. This had been prompted by the unusual abundance of the species along the eastern face of the Rocky Mountains from the Mexican border to central Montana. In this stretch of over a thousand miles I noted the species in every county through which I passed in Texas, New Mexico, Colorado and Wyoming. Usually the species is rare from central Wyoming northward and not too common in southern Wyoming and north-central Colorado. The reply to my request was generous. It is impossible here to give credit to everyone who sent me data. I have selected some of the most interesting and compiled them by regions. I might say at the outset that almost everyone reported an abnormal abundance of the Monarch this year.

As yet the northern periphery of the summer range has not been established. Dr. T.N. Freeman, of Ottawa, wrote that this past summer the species was taken as far north as Rupert House on the eastern coast of James Bay, P.Q., on June 8th, and at St. John's, Newfoundland, on July 11th. R.J. Fitch has found it at Lloydminster in Saskatchewan. On the West Coast it extends into British Columbia but I have not learned how far. Richard Guppy reports the species very rare on Vancouver Island. He knows of only one specimen taken there.

From the eastern Provinces and States I have several reports of migration. D.C. Ferguson of the Nova Scotia Museum of Science tells me "a biologist friend recently reported seeing vast numbers of them piling up against the coast at Vogler's Cover, Lunenburg Co., N.S. They were in greater numbers than he had ever before seen in Nova Scotia." Terry McCabe reported that there was a gathering of Monarchs at the foot of the Mount Washington, N.H., carriage road on 12-13 August. He took some 43 specimens and then stopped because "it wasn't sporting anymore". He had seen none on either the 10th or 11th and the group moved on during the afternoon of the 13th. Dr. C.L. Remington states that the migration southward had begun by 17 September at Woodbridge, Conn., and was going strong on the 24th. Stragglers were still moving southward as late as 10 October. Dr. P.H.H. Gray sent the only definite data on the northward movement. He found the spring arrivals early this year (1949), appearing on 9 and 10 June at the western end of the island of Montreal, P.Q.

Probably the most detailed observation of the southward migration made this year was that of Joseph Keji at Biggs Hospital, near Ithaca, N.Y. The results of his observations are presented in the graphs illustrating this article. Briefly, the peak of the migration occurred on 8 September when the rate was 139 per hour. By the 22nd the rate dropped to 36 per hour. As late as 8 November there was still an occasional Monarch on the wing.





From the Great Lakes region came these interesting notes: George Wren writing about the region around Chicago reported that: "I have, in past years, looked at hundreds of milkweed plants without seeing a plexippus larva but this year almost every third milkweed plant in some localities has a plexippus larva and many plants have two or three -- an almost unheard-of thing in my experience". William Sieker of Madison, Wis., reporting from localities well scattered over the State found the species had arrived earlier this year and was around later, October 8th, well beyond the first killing frost. He sent a clipping from the Milwaukee Sentinel dated 6 September that gave the fall migration a 7 inch column! As Bill said, the butterfly swarmed through Milwaukee! Roger E. Richard had this to say: "On 9.17.49 Mr. Perry Reynolds and Mr. James Cummins visited Pte. Pelee, Ontario, Canada. It was a rather stormy day with a strong wind blowing in from the South, off Lake Erie. The entire southern tip of the point was covered with D. plexippus in migration, literally hundreds of thousands on shrubs, trees, etc., all held up due to inclement weather and waiting for good weather to cross the lake to the South. This would have been an ideal time to 'band' or mark specimens but these gentlemen were not aware of the opportunity afforded. They did take movies, slides, etc., of the migration but the overcast weather made the project a gamble."

From the West Coast there is little to tell. Edward C. Johnston found the Monarch abundant and "so perfectly fresh that all must have recently emerged" on 19 September at Biggs, Oregon, on the south shore of the Columbia River. Dr. L.I. Hewes found the species on four islands in the Hawaiian group between 12 and 30 November.

So much for the North. In the South Dr. Ralph L. Chermock noted at Tuscaloosa, Ala., a marked northward migration in the later part of April that lasted two weeks. The peak was about 60 per hour on the two high-count days. W.M. Davidson, Orlando, Fla., writes that "The first examples of Danaus plexippus since I came here on April 1 were seen on September 14. On October 8 Dr. L.I. Hewes found the species swarming in the brush about 10 miles south of San Antonio, Texas. David Bauer, of Arizona, wrote of an interesting observation on Danaus berenice that should be brought to light here. "As far as a southward migration of D. berenice the most I have seen in regard to a migration occurred this fall here in the Verde River Valley. About the middle of Oct. D. berenice began to fly in a southerly direction. There were no large numbers but I was working out doors and could observe them all day long and every specimen which I saw was going South and they are all gone now; I haven't seen any specimens for about a month."

FIELD NOTES

CATOCALA FEIGNING DEATH.- For the attraction of nocturnal insects, entomology students at the Michigan Biological Station, Cheboygan Co., use a large carbon arc lamp which shines upon a large white cloth. The whole affair is on a wooden tower, so that the light may be seen for a considerable distance. August 8, 1950, was a warm, still night -- ideal for moths -- and Catocalas were numerous at the white cloth and around the lamp. As they were quite wary, the use of a net was generally necessary. Several times when the net was clapped over an Underwing lit on the cloth, the insect would fall suddenly, either into the net or onto the platform beneath, in which latter place it would lie quietly on its back until placed by hand in the killing jar. Although feigning death is not uncommon among the diurnal Lepidoptera, I had never observed it before among the moths.

Edward G. Voss
Ann Arbor, Michigan

BUTTERFLY FLYWAYS.- The account of butterfly flyways by Austin H. Clark in Lep. News, vol.4: p.13 (with editorial reference to former accounts) reminded me of two specific occasions on which I observed regularity in butterfly flight and made use of it in collecting specimens.

In Gregory Canyon, a small gulch just southwest of Boulder, Colorado, I made unsuccessful attempts to collect a swift-flying Speyeria until I discovered that it was flying a more or less regular "beat" among the shrubs and trees, perhaps 25 yards in greatest diameter. I stationed myself at a narrow passage between two willow thickets and took the specimen with no difficulty on its next round.

In the Dinosaur National Monument, in extreme northwestern Colorado, there is a very narrow ridge overlooking the Green River just below its junction with the Yampa River, called Harper's Corner. Near its northern end it becomes just about wide enough for a foot-trail and falls off close by on either side. There I found Papilio brucei flying regular "beats" among the piñons and junipers and was able to take several specimens with very little effort by posting myself at strategic points.

Hugo G. Rodeck
Boulder, Colorado

LEPIDOPTERA STRAYS IN NORTHERN MICHIGAN.- To the northern records of Erebus odora (Linné) recently published in the Lep. News (vol.2: pp.34,86; vol.4: p.13) may be added the following data on two specimens taken at light at the University of Michigan Biological Station, Cheboygan Co., Michigan, and now in the Station collection. One, somewhat tattered at the edges, is labeled Aug.1, 1939, Robert E. Serfling. The other specimen, in fairly good condition, was taken July 14, 1947, and bears the name of Syril Appleton as collector. A western stray in the region is the butterfly Nymphalis californica (Bdv.), of which I took one specimen at damp sand along the Straits of Mackinac in Emmet Co., Michigan, on Sept. 6, 1945.

Edward G. Voss
Ann Arbor, Michigan

TECHNIQUE NOTES

A SIMPLE SPREADING DEVICE

I am a collector of butterflies, and I keep my collection in Riker Mounts. For many years I have used a simple spreading technique, and today I am not positive whether it was picked up from a fellow collector or is in the main original. The large proportion of lepidopterists to whom I have shown the device, who appear never to have heard of it before, has induced me to describe briefly its advantages. Between two pieces of window glass, each about 3" x 4", is a layer of cotton-batting the same size. As I take a specimen out of a relaxing jar, I spread it partially on the cotton with tweezers, bringing the upper piece of glass down gently. If properly placed, the specimen will be spread almost perfectly by the carefully lowered upper piece of glass. After the glass is lowered, if necessary, the wings, body, and antennae can be moved into perfect symmetry with a long mounting needle. In most cases the weight of the glass will hold the upper specimen in place. By next morning the specimens are rigid enough to be placed into permanent cases.

Occasionally, with difficult little specimens, such as Skippers, it is advantageous to have the tip of the needle slightly curved, so that pressure against the veins of the wing will bring it into place without injury. Incidentally, a few half-sized sets are often helpful in spreading the smaller specimens, such as Hesperiidae or Lycaenidae, while a few double-sized sets are needed for Saturniidae, Papilionidae, and other larger forms. A code number on a tiny slip of paper, the same as the specimen may bear in the final Riker Mount, can well accompany each specimen, both in the relaxing-jar and while drying under the glass. Thus dozens or hundreds of specimens can be handled simultaneously without confusion.

Side mounts, showing the underside of the specimen, can easily be spread the same way. In mounting a specimen ventral side up, I usually first spread it dorsal side up. Then, after from 2 to 20 minutes (depending on the size of the specimen), when the wings have attained a fixed position but the specimen is still pliable, it can be placed upperside down upon a double layer of cotton, and the upper glass lowered gently. Within a few hours the specimens are ready to be placed, showing both sides of both sexes, if two pairs are available.

I have found my spreading device especially useful in surveying and sorting out a large series taken in one or more places. Especially if I am looking for trends or prevailing patterns, I may spread 50 to 200 specimens, all appearing to be the same thing until closer study. Thus, where symmetrical arrangement is not necessary, I have spread from 50 to 75 specimens in 20 minutes. When I have sorted out the three or four pairs I need for my collection, the rest return to the relaxing jar, and in a few hours are ready for envelopes as duplicates.

Thus, when we return with a summer's catch of two or three thousand specimens, the speed with which they can be spread depends entirely on how fast the relaxing-jar can produce them. The entire catch from one collecting area might carry the code "50BK" and be placed in one heap in the relaxing-jar. A spoonful of paradichlorbenzene crystals spread on the damp sand under the blotter will keep out mold, which forms so readily otherwise. The summer's catch may fill 40 or 50 Riker Mounts, bearing only locality labels. The winter months can then be conveniently used to sort out the material. The same 100 pieces of glass with perhaps 50 wads of cotton, have thus served me over and over to spread thousands of specimens over the years.

Arthur H. Moeck
Milwaukee, Wisconsin

AN EXPERIMENT WITH ATTRACTING MOTHS

During July an experiment was carried on to test the relative merits of two types of lighting source for traps, using two General Electric Co. lamps, the S-4 sunlamp and the BH-4, or "black lamp". In order to minimize so far as possible the influence of weather and the phases of the moon, the lamps were used on alternate nights, though as a matter of fact the weather was reasonably constant throughout the month. The following figures summarize the nightly catches of Lepidoptera of all families:

	S-4	BH-4
Average	777	304
Greatest catch	1698	747
Least catch	327	108

All unusual species were taken with the S-4. However, here is an interesting observation. The trap was hung about a foot from the white outer wall of the house, the house side of the light being shielded to reduce reflection on the wall. With the BH-4 very few moths were found resting on the house either when visited with a flashlight during the night or at dawn, whereas a considerable number roosted on the house when the S-4 was used, and a surprisingly large proportion, probably better than three-quarters, of the rarer species were taken on the house.

As the intensity of the S-4, both in the visible and ultraviolet, is much greater than that of the BH-4, the results will not permit any scientific deductions; they should be considered merely as of practical interest, demonstrating the relative merits of two sources of light available to the collector. In using either of them a word of warning is essential; special precautions must be taken to protect the eyes.

Charles P. Kimball
Rochester, New York

I use Riker mounts for my specimens. I find all Riker mounts are "overstuffed". I remove a layer of the filler cotton amounting to about one-fifth of the original thickness. Far less damage to legs and other body parts results.

Anonymous

Dr. J.H. McDUNNOUGH decided reluctantly for reasons of health and his advanced age to resign in advance his appointment to the staff of the Department of Insects of the Museum of Comparative Zoology at Harvard University (see Lep. News 4: p.31). He has decided to settle in Halifax, Nova Scotia, and to continue his work on American moths in more leisurely fashion at the Nova Scotia Museum of Science, where he will have the companionship of Douglas C. Ferguson, one of Canada's keenest field entomologists.

At the end of September 1950, the Museum Zoologicum Bogoriense of Bogor, Java, is sending a collecting party consisting of Mr. A.M.R. WEGNER (assistant curator), Mr. LIEM SWIE LIONG (assistant), and two Indonesian collectors to southeast Borneo. The party will collect naturalia, chiefly insects (with special attention to Lepidoptera and Odonata), in the vicinity of Balikpapan for about two months.

M. ABEL DUFRANE, Belgian lepidopterist who is curator of the Musée d'Histoire Naturelle in Mons, has been awarded the Prix Quinquennal for Natural Sciences of the "Amis du Hainaut". The notice of the award cites M. Dufrane's work with Microlepidoptera and with the insect fauna of Kivu, Belgian Congo.

Dr. LIONEL G. HIGGINS, of Woking, Surrey, England, noted British specialist in the genus Melitaea, visited and collected with C.F. dos Passos at Mendham, New Jersey, in May and with F.M. Brown at Colorado Springs, Colorado, during part of the summer.

We report with regret the passing of Dr. LAWRENCE I. HEWES on March 2, 1950, in San Francisco, California.

Dr. WALTER HACKMAN, of the Museum Zoologicum Universitatis, Helsinki, Finland, is now working on the Coleophoridae collected in 1949 by the Finnish-Swedish expedition to Newfoundland. There are about twenty species represented.

Dr. WALTER FORSTER, of the Entomologische Abteilung, Zoologische Sammlung des Staates, in Munich, Germany, has been on an extended collecting trip to South America, particularly Bolivia.

Dr. JEAN ROMIEUX, of Geneva, Switzerland, has been in Indo-China since October 1949.

Prof. KENNETH J. HAYWARD wrote that the second volume on Argentine Hesperiidae was in press and was expected to be out shortly. He is already at work on a volume on the Nymphalidae and Heliconiidae with 17 plates and 267 figures in color, "a somewhat brighter volume than the duller smaller Hesperiidae". He notes that the "748 species and subspecies" and forms of Argentine butterflies mentioned in the Lep. News (vol.3: p.103) are in addition to the Hesperiidae, of which a catalogue of about 450 forms has already been published. The catalogue of the other groups is expected to appear before the end of 1950.

On June 3rd, 1949, in Tjimahi, Java, died J.P. A. Kalis, the well-known professional collector of Lepidoptera and Coleoptera, at the age of 50 years. During many years he collected throughout the Malay Archipelago, chiefly in East Java, Bali, Lombok, and Celebes. His excellent collections of Rhopalocera and Heterocera went chiefly to Lord Rothschild at Tring and to the British Museum, Natural History, of London. Mrs. Th.F.R. Kalis, of Singaradja, Djalan Puri 3, Bali, is going to continue his work.

A. Diakonoff
Bogor, Java

RESEARCH REQUESTS

Prof. Harry Federley, distinguished authority on the cytology and genetics of Lepidoptera, wishes to obtain living material of all American species of Melalopha (= Ichthyura = Pygaera) for hybridization studies with European species of the genus. Probably the best system would be to send newly transformed pupae by airmail; newly-laid eggs might also be sent by airmail. Field collectors familiar with this notodontid genus would by supplying pupae to Prof. Federley be aiding internationally important cytogenetical research. He also hopes to get eggs or pupae of American Drepana. Address him as follows: Prof. Harry Federley, Genetiska Institutet, Norra Järnvägsgatan 13, Helsingfors, FINLAND.

Drs. G.W. Rawson and J.B. Ziegler, describers of the remarkable new Mitoura, M. hesseli, are working out the distribution of their new species. It has long been unnoticed in series of its very similar relative, M. gryneus (= damon). They wish to receive on loan any specimens of Mitoura from the range of the foodplant of M. hesseli, the White Cedar (Chamaecyparis thyoides). The latter is found on the East Coast from southern New Hampshire to Florida and Mississippi. Address them: Ciba Pharmaceutical Co., Summit, New Jersey.

Data and descriptions of experiences with Callosamia angulifera are needed for a study of the relative scarcity of the species, the zone of distribution, and differentiation of northern and southern forms, particularly those of the Carolinas. In addition to helpful data, pupae and ova of the species are sought either on a monetary or exchange basis. Write to:

Richard L. Halbert
2444-1/2 Cudahy St.
Huntington Park, Calif.

Mr. Jin-Sheng Lu, National Northwestern College of Agriculture, Wukung, Shensi, China, (correct address July 10, 1950) writes that he is engaged in a study of the Chinese Noctuidae, especially those species which are of some economic importance. His chief difficulty is a lack of literature and he requests help from foreign colleagues. He will try to send specimens in exchange for noctuid literature.

LETTER TO THE EDITOR

Port Washington, N.Y.
7 June 1950

To the Editor:

In the current issue of Lepidopterists' News (page 15, Vol.4) is a report by Mr. F. Martin Brown calling attention to a new ruling by the National Park Service which restricts collecting in National Parks to Federal employees. Included is the view of the Chief Naturalist that the new ruling is not disadvantageous to the Park Service or research.

From time to time I have visited a number of National Parks and Monuments in the West and Southwest, yet I have never met a Park Naturalist who was an entomologist nor have I ever found available a study collection of local insects. For a number of years I have been making a study of a small subfamily of moths known as the Heliothiinae. While the group comprises only some 175 species, I can think offhand of a half-dozen for which the type locality is a National Park, and in at least one case a biological island.

Mr. Brown's report states that there is some possibility that a specialist might be able to negotiate permission to collect in his particular field in a National Park. In the early spring of 1949 I collected in the Big Bend National Park under the old ruling. Nothing turned up in my group and I did some incidental collecting of other groups. This material was apparently of real interest to the two great museums in which it was deposited. Under the new ruling such incidental collecting would be banned. It provides, however, a valuable source of study material, often collected by people interested in natural history who are not entomologists.

For example, I recently described two new Heliothiinae. The specimens in one case were taken by an ethnolcgist in New Mexico and sent to the U.S. National Museum. In the other case, the specimen was collected by people primarily interested in ornithology and deposited in the American Museum of Natural History. As far as I am aware, these are the first new heliothiids which have been turned up since the Sperrys described C. jaegeri in 1940. These illustrations show the value of incidental collecting. As one of these new species was collected in a National Park, it would not have been taken under the new ruling.

I am sympathetic with the preservation of our National Parks and I can only wonder whether the new restriction is the best solution of the administrative problems of the Park Service. However, even the limited experience of one individual working in a restricted field suggests that further examination is required of the opinion that the new regulation "is not disadvantageous to research".

Very truly yours,

(signed) Rowland R. McElvare

MOISTURE AND CHOICE OF INSECT PINS

Dr. Petr Wygodzinsky, of Tucumán, Argentina, recently wrote: "It is with certain surprise that I see that you recommend [Lep. News, vol.4: p.31] black steel minuten nadeln. I am convinced that if the respective microclimate where the collection is kept is not very dry, only minuten of stainless steel should be used. Even minuten made of silver wire may oxidize, be it through the action of the body juices of the insect itself, be it through humidity, be it through the action of disinfectants kept in the boxes. Minuten nadeln are used much for small Diptera, and these as well as Microlepidoptera are irrevocably lost if the pins are not of first class quality. When these were not available, I preferred to mount small insects with glue on the tip of paper triangles, which protects them much better. But for larger insects, if any possible only pins made of stainless steel should be used. Even if good white or black pins are employed, they are sure to oxidize within 10 or 20 years. I have seen a great deal of old material (about 80 years) of Hemiptera from European collections, mounted on good white pins (apparently these very old white pins were much better than those fabricated today) but still I remounted the insects to save them from sure destruction".

Using the right type of pin is of considerable importance, as Dr. Wygodzinsky has pointed out. We welcome comments from News readers who have had difficulty or long success with any type of pin.

MARKING MIGRANT MONARCHS

A few years ago Dr. F.A. Urquhart, Director of the Royal Ontario Museum of Zoology, published a preliminary paper in the Canadian Entomologist on his project of marking migrating Monarch butterflies by fastening small paper labels on the wings. In response to a recent query concerning the results of his work, he wrote: "In the year that we placed our small tickets on the wings of this butterfly, some 3,000 specimens were labeled, of which we received only 7 returns, none of them significant. As you are no doubt well aware, it would be necessary to mark many thousands of butterflies in order to obtain a few significant returns.

"We intend to continue our work this year, with the assistance of some of the members of the naturalists' club. Perhaps our combined efforts may produce some interesting returns. ...The method we used in marking the Monarch butterfly... proved very successful. It was possible to capture, insert the label and liberate the specimen, on an average of eight seconds per specimen, and those returned to us still had the label intact and it was almost impossible to remove it without damaging the wing."

C.A. Anderson, of Dallas, Texas, is now dipping part of the wing of Monarch butterflies in red chick dye just before he releases the specimens. The process apparently does not hamper their flying ability. He also stamps the wings to make identity certain in the event of recoveries. (See Lep. News 4: p.31).

A NEW GERMAN PERIODICAL FOR LEPIDOPTEROLOGY

The only German periodical dealing exclusively with Lepidopterology was Iris (Dresden; since 1884), which was discontinued in 1944. Now the appearance of a new lepidopterological periodical, the Zeitschrift für Lepidopterologie, can be reported. It is published by Dr. Max Cretschmar (Celle), Albert Grabe (Dortmund), and Georg Warnecke (Hamburg-Altona), editorship Hermann Jung (Viersen). The annual subscription fee is 16 German Marks. The first issue, of May 1950, which has been sent to The Lepidopterists' Society, contains 64 pages (2 plates); the whole annual volume will have 192 pages. Articles in all modern languages are to be sent to the editors, of whom Dr. Cretschmar and Herr Warnecke are members of The Lepidopterists' Society (see membership list).

An introduction by the editors gives a short historical review of the German entomological periodicals and discusses the difficult situation of post-war German lepidopterology. The individual articles (see "Recent Literature on Lepidoptera") deal with faunistic field summaries, with general migration problems and the 1946 immigration of Celerio lineata livornica into Central Europe, with the description of new forms of Nothris obscuripennis (Lep., Gelechiidae), of Actinote erinome (Lep., Acraeinae), and of Ocnogyna latreillei (Lep., Arctiidae), with short notes and observations, and with a detailed review of recent literature. Besides German authors, there are articles by Austrian, Swedish, and Spanish lepidopterists.

This new periodical will be no doubt much welcomed in Germany and the rest of Europe. It is to be hoped that the new Zeitschrift für Lepidopterologie will have a long life and find a wide distribution all over the world.

Gerhard Hesselbarth
Diepholz/Hann., Germany

[Ed. Note: This valuable new periodical should prove of interest to all lepidopterists who read German. We congratulate its founders on their bold venture under difficult conditions and on the high quality of the new Zeitschrift. Subscription fees should be sent to the publisher: Goecke and Evers, Krefeld, Germany. C.L.R.]

ENTOMOLOGICAL SOCIETY IN INDONESIA AND A NEW PERIODICAL

After a lethargy of 8 years due to the war and to postwar difficulties, the "Nederlandsch-Indische Entomologische Vereeniging" has been reërected in Bogor (formerly Buitenzorg) on Dec. 11, 1949, under the new name of "Entomologische Vereeniging in Indonesië". The Society has the same aim as the previous one, viz. to promote entomological science in Indonesia by means of meetings, exhibits, excursions and the publication of a periodical, "Idea" (named after a common Javanese Nymphalid butterfly, Idea (Hestia) hypermnestra Westw.). The chairman is Prof. Dr. L.J. Toxopeus, University of Indonesia, Bandung, Java.

This periodical is a continuation of the Entomologische Mededeelingen van Nederlandsch-Indië of which volumes 1-7, 1935-1941, were issued; consequently Idea begins with volume 8, of which combined parts 1-2 appeared on May 8, 1950; one volume, consisting of four parts, will appear annually. Except for the abbreviated proceedings of the meetings, notes of the Board and an information column, leading articles and short papers will be printed, for which the English language has preference, but also Dutch and Indonesian with a short English summary may be used.

The members of the Society receive Idea free of charge. The annual contribution for the members abroad is an amount equivalent to $4.00 (U.S.A.). The subscription price for Idea is the same.

Volumes of the Entomologische Mededeelingen van Nederlandsch-Indië 1-7, 1935-1941, can be had from the Editor (Dr. A. Diakonoff, Pledang 25 pav., Bogor, Java, Indonesia) for the price of $4.00 (U.S.A.) per volume.

A. Diakonoff

[Ed. Note: Idea is on file in the Lepidopterists' Society library for reference by Society members.]

The PROCEEDINGS OF THE EIGHTH INTERNATIONAL CONGRESS OF ENTOMOLOGY have been published and are now available for 50 Swedish crowns (about $10) from:

Sekretariat, VIII Intern. Entomolog-Kongr.
Stockholm 50, Sweden

BOOK REVIEWS

17. "De Plagen van de Cultuurgewassen in Indonesia", vol.1*, by L.G.E. Kalshoven

The translation of the title is: "The Pests of Cultivated Plant Crops in Indonesia". It is in Dutch. This handbook is richly illustrated with drawings, photographs, and colored plates and forms an extract from notes and observations collected by many applied entomologists through more than twenty years. Since the handbook by Dammerman, Agricultural Zoology of the East Indian Archipelago, of 1929, no comprehensive work of this kind has been published in this country. A large part of the book is dedicated to insect pests; in this part the orders Apterygota, Dermaptera, Embioptera, Psocoptera, Isoptera, Thysanoptera, Rhynchota, Odonata, Neuroptera, and a part of Lepidoptera are treated. Of the latter order the following heterocerous families are reviewed: Hepialidae, Cossidae, Squamuridae, Pyralidae, Thyrididae, Psychidae, Limacodidae, and Epipyropidae. The second part, which will appear in the course of this year, will deal with the remaining Lepidoptera and other insects, birds, and mammals, and also include English captions to illustrations in both parts.

A. Diakonoff, Bogor, Java

---

*512 pp., 298 figs., 8 pls. Published 1950 by W. van Hoeve, The Hague, Netherlands. Price: 33.75 guilders (Dutch).

MEASUREMENTS AND LEPIDOPTERA

by F. Martin Brown
Colorado Springs, Colorado

As the attention of lepidopterists shifts from species to subspecies the need develops for a better understanding of the value of measurements. So long as the taxonomist is dealing with species he usually can find differences that clearly set apart each species. Between subspecies the differences are more subtle and frequently are quantitative not qualitative. Just as soon as quantitative differences become important the question of statistical significance arises. If two fractions of a population seem to differ in size, is this difference real? If two fractions differ in the amount of marking, are these differences real?

Since the turn of the century, mathematicians have been devising methods for testing the validity of differences among all sorts of measures and based upon samples of various sizes. All too few taxonomists have used these useful aids. An outstanding proponent of statistics in taxonomy has been Kinsey, working with gall-forming insects. Few others have made any use of statistics in all of its aspects. It is time that all taxonomists who use measurements become aware of the usefulness of this tool.

Generally the taxonomist is satisfied with giving an average dimension or frequency with no reference to the size of the series studied nor to the variability found. All too often size is given empirically - "subspecies A is a little larger than subspecies B". Such a statement has no value. To point up just what I mean let me take examples from a study that has all of the earmarks of a thorough job yet falls down miserably so far as measurements are concerned. Its author has gone into far more numerical detail than have most of the current working taxonomists. For all of this, the results of his labors are of little use, in fact may be misleading, because he did not discover how much variation from his stated measures might be expected.

I have before me a recent generic revision, Prof. V. Nabokov's "Nearctic Lycaeides" (Bull. M.C.Z. 101: 479-541; 1949). It gives every evidence of being a painstakingly careful study of these "Blues". Many of the conclusions at which Prof. Nabokov arrives are based upon careful measurements; yet nowhere does he give evidence of having tested the statistical validity of these measurement-based conclusions. This, for me, detracts much from the value of the work.

In several places, such as on p.525, Prof. Nabokov notes that the length of "F", a part of the male genitalia, varies with the size of the insect when that size is noted in terms of the maximum radius of the forewing. His table of means for the genitalic measures F, H, U, and E. on p.540 does not mention the means for the wing-length. Without this last measure "F", for instance, is proportional to the size of the insect or varies independently of the size. Yet Prof. Nabokov seems to use the absolute length of "F" as a diagnostic character with no reference to the length of the forewing.

If, for each race, a table of measurements like that on p.513 had been included for each specimen examined, then Prof. Nabokov's measurements would have much more meaning. I realize that such inclusion would have added two or three pages to the printed result. Perhaps the editors and not Prof. Nabokov are responsible. The detailed data set forth in the table referred to might have been greatly reduced and have been even more useful if several simple statistical procedures had been used. It is unfortunate that the great majority of taxonomic biologists fail to make use of these techniques for stating a lot in a small space.

Taking the table referred to in the preceding paragraph as an example let us see how much more informative the data can be made. The length of nine falces are given; also the mean and the range of length. A few minutes' work with a pencil and pad shows that the mean and its probable error are 48.8 ±1.7 units, and that the standard deviation is 2.45 units. One step further shows that in a typical population of Lycaeides argyrognomen sublivens, the race being discussed, 95% of the specimens will have falces that fall between 44.0 and 53.6 units in length and 99% of such specimens captured will have falces that fall between 42.4 and 55.2 units in length.

Although a table of data is not presented for the next race discussed, longius, measurements on seven specimens are scattered in the text. When these are gathered and treated statistically and compared with the data for sublivens it appears that in a large series of these two races there will be a considerable overlap in dimensions.

	sublivens	longius
Number of Specimens	9	7
Mean Length of "F"	48.8 ± 1.7	53.9 ± 1.8
Standard Deviation	2.45	2.70
95% Limits	44.0 - 53.6	48.6 - 59.2
99% Limits	42.4 - 55.2	47.0 - 60.8

The question then is, is the apparent difference seen in the mean lengths of "F" real or only a result of the small size of the sample used? This can be tested mathematically and the chance of the two being samples drawn from the same general population estimated. The difference between the two

means is 5.1 ± 1.3. The difference is 3.92 times its probable error. The chance of this occurring solely through the technique by which the samples were drawn is less than 1 in 120 — assuming that sublivens and longius might constitute extremes of a single natural population. On such a basis it would require a series of about 1000 measurements to prove STATISTICALLY whether or not the observed difference was really of racial value. However, since Prof. Nabokov has pointed out that size of the insect has something to do with the length of "F" the above conclusion is not valid since size of the insect was not considered. The fact that my series of three topotypical longius are about the same size as Prof. Nabokov's series of sublivens may be considered an INDICATION but cannot be used statistically. Only the seven specimens used for the genitalic statistics can be used.

All of Prof. Nabokov's time-consuming counts of scale-rows means nothing until the statistical parameters of the data on each subspecies is established. His original data should be properly analyzed and then those data published. When this is done some order may come of the chaotic mass of information presented in the paper.

Perhaps there are some readers of The Lepidopterists' News who would like to use more refined statistical procedures but hesitate because of lack of statistical training. They should not hesitate if they can do simple arithmetic accurately. Mathematical procedures boil down to the four fundamentals of addition, substraction, multiplication, and division. Many of the simpler methods of testing the significance of measurements can be learned quickly. To aid those who are interested in improving the quality of their work this way I propose to present a series of five articles discussing the use of different statistical procedures that have proved useful in taxonomy.

The first of these will deal mostly with definitions and where to find detailed instructions about the mathematics involved. This will be followed by a discussion of sample sizes and the effects of the size on the resultant parameters. The third will be devoted to frequency measures and next to correlation measures. The final article will treat comparisons of series and of individuals.

MISCELLANY

CORRECTION ON THE HOPE DEPARTMENT

In the note on the retirement of Prof. G.D.Hale Carpenter [Lep. News 4: p.9], by some unaccountable lapse we gave the Hope Professorship for Cambridge University. The distinguished Hope Department is of course at Oxford, in the University Museum. Cambridge has no chair of Entomology. Drs. P.H.H. Gray and C.B. Williams kindly called our attention to the error. Doubtless many other English colleagues were startled. Being a Harvard man at Yale I should have learned by now to be very precise in references to universities! My sincere apologies are extended to Professor Carpenter.

C.L. Remington

Minoru Sawada, a sophomore in the Hokkaido Liberal Arts College, hopes to exchange letters and butterfly specimens with students in other countries. His address is: South 8, West 26, Sapporo, Japan.

The note regarding pin labels available from The Nature Co., P.O. Box 403, Covington, La. [Lep. News 4: p.31] was out-of-date regarding the prices. The correct prices on four-line (or less) labels are: $0.55 per 500, $0.85 per 1000, and $0.55 for each additional thousand of the same label.

C.L.R.

PLEASE SEND PROMPT NOTIFICATION
TO THE LEPIDOPTERISTS' NEWS
WHEN YOUR ADDRESS IS CHANGED

A recent letter from Austin H. Clark, of the U.S. National Museum, has a note on a curious Lepidoptera larva he has encountered: "In New England there is a micro that feeds as a larva on the woolly exudations of woolly aphids on the alder. I have found these larvae when looking for the larvae of Feniseca, but I have never raised them. They seem only to neatly shave the aphids, never eating them."

Herr Georg Warnecke, of Hamburg, Germany, writes that Guenée's record of the noctuid, Crymodes exulis borea H.-S., occurring in Lapland has never been confirmed. Careful collecting has failed to reveal it in Lapland or any other part of Fennoscandia. In the Lep. News (vol.4: p.29) Johnston quoted McDunnough's note on Guenée's statement.

Dr. R. Mell, Hainbuchenstrasse 34, Berlin-Frohnau, Germany, wishes to sell paratypes of 9 new species and 37 new subspecies of Lepidoptera described by him from China. These include butterflies, Sphingidae, Brahmeidae, Saturniidae, Catocala, etc.

We have a supply of membership applications and the circular announcement for the IXth International Congress of Entomology, to be held in Amsterdam in August 1951. We will be very glad to send them to Lepidopterists' Society members requesting them and are particularly anxious to have the names of all Society members planning to attend the Congress.

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped eventually that our coverage of the world literature will be virtually complete. It is intended that every paper published since 31 December 1946 will be included. In the first three volumes of the Lep. News 886 were listed. Abstracts give all new subspecies and higher categories with generotypes and type localities. Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members and the many recently received are gratefully acknowledged. Initials of cooperating abstractors are as follows: (P.B.) - P.F. Bellinger; (A.D.) - A. Diakonoff; (C.dP.) - C.F. dos Passos; (L.G.) - L.A. Gozmány; (G.dL.) - G. de Lattin; (C.R.) - C.L. Remington; (T.S.) - T. Shirôzu. A complete set of these pages, for clipping and filing, may be obtained for Vol.4 for $0.50.

254. Agenjo, R., "El aparato auxiliar del andropigio en las Epischnia Hb., y descripción de una nueva especie de este género dedicada al Excmo. Sr. Presidente de la República Argentina, General D. Juan Domingo Peron (Lep. Phycit.)" [In Spanish]. Eos, vol.24: pp.7-24, 2 pls., 6 figs. 31 Mar. 1948. Describes as new E. peroni (Spain). Discusses at length the three Spanish spp., with comparative descriptions and figures and outline of distribution. [P.B.]

255. Agenjo, R., "Sobre la morfologia y distribución geográfica de Issoria lathonia (L.) en España" [In Spanish]. Eos, vol.24: pp.29-55, 2 pls. 31 Mar. 1948. Discusses distribution and variation at length. Describes 15 'forms', 7 of them new; all are figured, some in color. Naming of these forms, which the author himself does not consider worth subspecific rank is a defect in an excellent paper. [P.B.]

256. Agenjo, R., "La ♀ de Adalbertia castiliaria (Stgr.) y una segunda generación de esta especie (Lep. Geom.)" [In Spanish]. Eos, vol.24: pp.213-232, 3 pls. 30 June 1948. Describes both (naming latter); compares sp. with superficially similar ones. [P.B.]

257. Agenjo, R., "Nuevas subespecies burgalesas de las Anthrocera rhadamanthus (Esp.), fausta (L.) y trifolii (Esp.)" [In Spanish]. Eos, vol.24: pp.391-401. 31 Oct. 1948. Describes as new: A. (Peristygia) rhadamanthus rasura, A. (Agrumenia) fausta fernan, and A. (Anthrocera) trifolii lain-calvo, all from Burgos Province, Spain. No figures. [P.B.]

258. Agrell, Ivar, "Some Experiments concerning Thermal Adjustment and Respiratory Metabolism in Insects." Arkiv för Zool., vol.39A, no.10: 48 pp., 19 figs. 10 Jan. 1948. Study of the effects of temperature changes on metabolism in a number of insects, including Ephestia larvae and Phalera bucephala pupae. [P.B.]

259. Anonymous, "An Oleander Butterfly (Euploea corinna)." Agr. Gaz. N.S. Wales, vol.59: pp.90-91, 1 fig. 1 Feb. 1948.

260. Anonymous, "The Orange-Barred Grass Moth (Eutane terminalis)." Agr. Gaz. N.S. Wales, vol.59: p.91, 3 figs. 1 Feb. 1948.

261. Anonymous, "Cabbage Moths (Plutella maculipennis) and Cabbage White Butterflies (Pieris rapae)." Agr. Gaz. N.S. Wales, vol.59: pp.203-205, 4 figs. 1 Apr. 1948.

262. Anonymous, "Caterpillars." Agr. Gaz. N.S. Wales, vol.59: pp.261-262, 5 figs. 1 May 1948. Zizeeria labradus, Maruca testulalis, Heliothis armigera, Plusia sp. [P.B.]

263. Anonymous, "The Fruit-Tree Moth Borer (Maroga unipuncta)." Agr. Gaz. N.S. Wales, vol.59: pp.374-375, 2 figs. 1 July 1948.

264. Anonymous, "The Heliothis Caterpillar (Heliothis armigera)." Agr. Gaz. N.S. Wales, vol.59: pp.470-479, 6 figs. 1 Sept. 1948.

265. Antram, Chas. B., "Note on the Butterflies of the New Forest Area in 1948 Compared With 1947 and Weather Conditions." Ent. Rec. and Journ. Var., vol. 60: pp.122-124. Dec. 1948.

266. Arbuthnot, K.D., "Temperature and Precipitation in Relation to the Number of Generations of European Corn Borer in the United States." U.S.D.A. Tech. Bull., no. 987: 22 pp., 5 figs. July 1949. Prediction of no. of generations to be expected in various parts of the U.S., based on observed relation between climate and no. of generations in the Old World. No. of generations genetically controlled. [P.B.]

267. Ardö, Paul, and Bertil Lindquist, "On Laspeyresia grossana Haw., a pest in the beech woods of northwestern Europe" [In Swedish, English summary]. Medd. Stat. Skogsforskinst., vol.36, no.4: 30 pp., 10 figs. 1948. Morphology, biology, distribution. [P.B.]

268. Astaurov, B.L., "Iskusstvennyĭ temperatunyĭ partenogenez u kitaĭsk og odu'ovogo shelkoprĭada (Antheraea pernyi Guér-Mén.)"[Artificial parthenogenesis produced by heat in the Chinese silkworm] [In Russian]. Doklady Akad. Nauk SSSR, vol.59: pp.1029-1032. 1948.

269. Bailey, Stanley F., "The Peach Twig Borer." Calif. Agr. Exp.Sta. Bull., no.708: 56 pp., 12 figs. Sept. 1948. General account of Anarsia lineatella. [P.B.]

270. Bank, G., Jr., "De kwiklamp als lokmiddel voor insecten" [In Dutch; Mercury vapour lamp as trap for insects]. Ent. Berichten, vol.12: pp.433-434. 1 Nov. 1949. Mercury vapour lamps are extremely useful in collecting nocturnal Lepidoptera because: 1) of the great attractive power upon insects; and 2) of their economy (160 watt with light intensity of 300 decalumen). The number of specimens attracted is about seven or eight times as large as with ordinary filament lamps. [A.D.]

271. Barney, R.W., "Interesting Butterflies at Kakamega." Nature in E. Africa, ser.2, no.1: pp.5-6. May 1949.

272. Beebe, William, "What's in a Butterfly's Name?" Animal Kingdom, vol.51: pp.14-15, 2 figs. Jan.-Feb. 1948. Popular account of Linnaeus' method of naming butterflies. [P.B.]

273. Benander, Per, "Gotlandska smafjarilar, nya for Sverige (Lep.)" [In Swedish, English summary]. Opuscula Entomologica, vol.13: p.171. 31 Dec. 1948.

274. Bentinck, G.A., "Nieuwe en zeldzame Lepidoptera in 1948" [In Dutch; New and rare Lep. in 1948]. Verslag 81ste Wintervergadering Nederl. Ent. Ver., pp. v-vii. 1 Mar. 1950. Captures of seven species of Microlepidoptera new for the fauna of Holland and of a number of other rare species are recorded. [A.D.]

275. Bird, J.F., "Notes on Migrants and Light in North Somerset During 1947." Ent. Rec. and Journ. Var., vol.60: pp.105-107. Oct. 1948.

276. Breakey, E.P., and G.S. Batchelor, "The Orange Tortrix, a Pest of Raspberries in Western Washington." Journ. Econ. Ent., vol.41: pp.805-806. June 1948.

277. Brunn, Henrik, "Beitrag zur Kenntnis der Schmetterlingsfauna von Västmanland und Härjedalen" [In Swedish, German summary]. Opuscula Entomologica, vol.13: pp.157-158. 31 Dec. 1948.

278. Brunson, M.H., "Secondary Parasites of the Oriental Fruit Moth through Macrocentrus ancylivorus." Journ. Econ. Ent., vol.41: pp.119-120. Feb. 1948.

279. Brunson, M.H., and H.W. Allen, "Oriental Fruit Moth Cocoon Parasites." Journ. Econ. Ent., vol.41: pp.446-450. June 1948.

280. Bryk, Felix, "Daniel Solander, der ursprungliche Besitzer des aufgefundenen Linnéschen Typus von Papilio teucer L. (Lep. Brassolidae)" [In German]. Opuscula Entomologica, vol.13: p.168. 31 Dec. 1948.

281. Bryk, Felix, "Entomological Results from the Swedish Expedition 1934 to Burma and British India. Lepidoptera: Fam. Notodontidae Stephens, Cossidae Newman und Hepialidae Stephens. Gesammelt von René Malaise" [In German]. Arkiv för Zoologi, vol.42A, no. 19: 51 pp., 4 pls., 1 map. 1950. Describes the following as new [new genera in CAPITALS, the type species or subspecies (sic!), also new, immediately following]: (Notodontidae) Dudusa sphingiformis birmana; ANGUSTIALA, A. cryptocephala; Plusiogramma aurosigna form homogena; Phalera sangana birmicola; P. albicauda; PHALEROMIMUS, P. albocalceolata; PHEOSIOPSIS, P. niveipicta; Pydna aurata midas; P. eburnea; P. (Ceira) griseodivisa; P. (C.) albidostriata; P. (C.) mediodivisa; P. (C.) prominens; P. (C.) plusioides; P. (C.) alboflavida; P.? brunneosticta; Pseudofentonia obliquiplaga roseogrisea; P. diversipectinata; Stauropus ferrugineozonatus; S. sporadochlorus; LIBIDO, L. voluptuosa (!); MIMESISOMERA, M. aureobrunnea; Dicranura birmica; Damata longipennis japonica (Japan); Notodonta flavicincta birmidonta; N. peniculus; N. scutellaris; N. antennalis; SPATALINA, S. argentata birmalina; NEOPHYTA, N. argentifera sikkima; Rosama plusioides X-magnum; R. sororella (Shan States); R. eminens; PSEUDONERICE, P. unidentata; Pygaera fulgurita larga; P. mahatma; PODOCRYPTULA, P. nana (Tenasserim); (Cossidae) Xyleutes obliquifascia; X. clara; Catopta albonubilosus birmanopta; (Hepialidae) Hepialus ebba. Type locality of all, unless specified, is Kambaiti, N. Burma; a more extensive range is given for some, but no specimens are recorded from other localities. Notes on some other spp. Adults of most of above are figured; no figures of venation, no mention or figures of genitalia. The new genus Neophyta is not described at all! Future workers will suffer for papers like this. [P.B.]

282. Burkhardt, V.R., "Collecting in West Surrey - 1947." Ent. Rec. Journ. Var., vol.60: pp.25-28. Mar. 1948.

283. Burr, Malcolm,"Field Notes from Anatolia." Ent. Rec. Journ. Var., vol.59: pp.148-151; vol.60: pp. 10-14,71-73,103-105,112-115; 4 pls. Dec. 1947; Jan., June, Oct.,Nov. 1948.

284. Carlgren, Georg, "En för Sverige ny noctuid" [In Swedish, English summary]. Opuscula Entomologica, vol.13: p.45. 21 June 1948. Rhyacia saucia. [P.B.]

285. Carolsfeld-Krausé, A.C., "Some remarks on the synonymy of the Fagus-feeding Nepticulae (Nepticulidae, Lepidoptera)." Ent. Meddelelser, vol.25: pp.299-310, 1 pl. 25 Nov. 1948. Synonymizes N. hemargyrella and N. tityrella under N. turicella, and N. fulgens under N. basalella. Rejects N. brunnensis, based on a single empty mine. Notes on life history. [P.B.]

286. Caspari, Ernst, "Physiological Action of Eye Color Mutants in The Moths Ephestia kühniella and Ptychopoda seriata." Quart. Rev. Biol., vol.24: pp.185-199, 4 figs. Sept. 1949. The phenotypic effect of certain eye-color mutants in various insects is known to be mediated by diffusible substances ("hormones") present in the larval and pupal hemolymph. Because of the possibility of chemical analysis of intermediate substances and reactions, these forms are especially favorable for studies on the mechanism of gene action. Dr. Caspari, the original discoverer of this phenomenon in Ephestia, reviews thoroughly the present state of our knowledge dealing with eye-structure and development, pigment chemistry, and the nature and physiological action of the diffusible substances concerned. It is perhaps unfortunate that the scope of the review could not have been extended to include the great amount of information available from similar studies in other insects, notably Drosophila and Bombyx; however, the present treatment makes for a more compact summary, while sacrificing little information of general importance. [P.B.]

287. Caspari, E., and J. Richards, "Genic Action." Carnegie Inst. Wash. Yearbook, vol.47: pp.183-189. 1948. Discusses mode of action of gene a (white eye) in Ephestia. [P.B.]

288. Chamberlin, Joseph C., "Insects of Agricultural and Household Importance in Alaska with Suggestions for Their Control." Alaska Agr. Exp. Sta. Circ., no.9: 59 pp., 21 figs. 1949. Includes descriptions and figures of several moths and larvae. [P.B.]

289. Ciampolini, Mario, "Contributo alla conoscenza morfologica e biologica della Diloba coeruleocephala L. (Lepidoptera Noctuidae)." [In Italian]. Redia, vol.33: pp.143-189, 28 figs. 1948. An exhaustive monograph of this species; all stages are described and figured. [P.B.]

290. Clausen, Lucy, "The Life History of the Monarch Butterfly." Am. Mus. Nat. Hist. Sci. Guide, no.132: 15 pp., 13 figs. 1948. Popular account. [P.B.]

291. Cockayne, E.A., "Selidosema plumaria, Schiff., R. tyronensis." Ent. Rec. Journ. Var., vol.60: p.79. July/Aug. 1948. Names an extinct 'race' from a single bog. [P.B.]

292. Cockayne, E.A., "Aberrations of British Lepidoptera (Geometridae)." Entomologist, vol.83: pp.49-55, 1 pl. Mar. 1950. Describes and names 28. [P.B.]

293. Cole, A.C., "Illustrated keys to the immature forms (exclusive of eggs, nymphs, and pupae) of the more common orders and families of Tennessee insects." Rep. Reelfoot Lake Biol. Sta., vol.11: pp. 28-44, 2 pl. Jan. 1947. Includes key to 18 families of Lepidoptera. [P.B.]

294. Comenga, M. and E. Ojeda, "Sobre el metabolismo del Bombyx mori L. I. Antecedentes y composition global. II.Materia seca y agua. III. Glúcidos y lipides. IV.Metabolismo de Prótides" [In Spanish, English summary]. Rev.Española Fisiol.,vol.3: pp. 145-164, 351-370; vol.4: pp.109-116, 117-120. June, Dec.1947; June 1948. Series deals with larval metabolism and its modification in later stages. [P.B.]

295. Comstock, John Adams, "Notes on the life history of Orthodes accurata Hy.Edwards." Bull. So. Calif. Acad. Sci., vol.46: pp.124-126, 1 pl. 20 Apr. 1948. Describes and figures mature larva and pupa. Food plant Brickellia sp. [P.B.]

296. Comstock, John A., "The larva and pupa of Eumaeus debora Hbn." Bull. So. Calif. Acad. Sci., vol.47: pp.3-5, 1 pl. 20 July 1948. Mature larva and pupa described and figured. Food plant Dioön edule.[P.B.]

297. Comstock, John Adams, "The mature larva and pupa of Arctonotus terlootii Hy.Edw." Bull. So. Calif. Acad. Sci., vol.47: pp.49-51, 2 figs. 20 Aug. 1948. Both figured. Food plant Boerhaavia concinna. [P.B.]

298. Corporaal, J.B., "Diefstal van Lepidoptera te Parijs" [In Dutch; Theft of Lepidoptera in Paris]. Verslag 81ste Wintervergadering Nederl. Ent. Ver.: p.iv. 1 Mar.1950. About 20,000 specimens from the large Le Moult collection of Heterocera of the world have been stolen. A French lepidopterist is suspected but there are no proofs. (A warning for everyone who buys material of this group, chiefly Morpho, Ornithoptera, Charaxes, Agias, Papilio, Parnassius, etc.). [A.D.]

RECENT LITERATURE ON LEPIDOPTERA - cont.

299. da Costa Lima, A., "Sobre Parasitos e Hipoparasitos do Curuquerê (Alabama argillacea)" [In Portuguese]. An. Acad. Brasil. Cien., vol.20: pp.31-37, 4 figs. 1948. Lists about 50 parasites; describes one new ichneumonid. [P.B.]

300. Couchman, L.E., "Notes on the Geographical Races of Hesperilla chrysotricha Meyrick and Lower (Lepidoptera-Hesperiidae)." Pap. Proc. Roy. Soc. Tasmania, 1948: pp.65-73, 1 pl. 15 Sept. 1949. Describes as new: H. c. naua (Pt. Lincoln, S. Australia); H. c. lunawanna (S. Tasmania). Discusses range, distinguishing characters and biology of these and 4 other subspecies. [P.B.]

301. Crozes, J., "Melanargia syllius Herbst, dans la Basse-Ariege" [In French]. Rev. Franç. Lepid., vol. 11: pp.230-231. 22 Jan. 1948.

302. Danilevsky, A.S., "Novye Predstaviteli Roda Hemimene Hbn. (Lepidoptera, Tortricidae) Palearkticheskoi Fauny" [In Russian; New representatives of the genus Hemimene in the Palearctic fauna]. Ent. Obozrenie, vol.30: pp.68-81, 19 figs. 1948. Describes as new: H. filipjevi (West Georgia); H. dzhungarica (Sinkiang); H. immaculata (E. Caucasus); H. albimacula (N. Caucasus); H. cinerascens (E. Europe generally); H. caucasica (Transcaucasus); H. gracilis (Daghestan); H. eximia (N. Caucasus); H. rjabovi (Daghestan); H. inconspicua (Armenia); H. fusca (Daghestan); H. uralensis (S. Urals); H. proxima "Filipjev (in litt.)" (Daghestan); H. unicolor "Filipjev (in litt.)" (Daghestan). Gives new name H. pseudoalpestrana to sp. apparently confused with alpestrana. Figures genitalia of all but pseudoalpestrana and alpestrana. [P.B.]

303. Danilevsky, A.S., "Fotoperiodicheskaîa reaktsiîa nasekomykh v usloviîakh iskusstvennogo osveshcheniîa" [In Russian; Photoperiodic reactions of insects under similar conditions of artificial illumination]. Doklady Akad. Nauk SSSR, vol.60: pp.481-484. 1948.

304. Danilevsky, A.S., and G.G. Shel'deshova, "Biologiîa i morfologicheskie osobennosti grushevoî plodozhorki (Carpocapsa pyrivora Danilevsky)" [Biology and morphological features of the pear leaf roller; in Russian]. Zool. Zhurnal, vol.29: pp.69-81, 5 figs. 1950.

305. Dannreuther, T., "Maximum year records of immigrant Lepidoptera in the British Isles." Journ. Sci. Brit. Ent., vol.3: pp.49-51. 15 Mar. 1949.

306. Dannreuther, T., "Records of five rare vagrant Wainscots (Lep., Leucania) observed in the British Isles during 1945-48." Journ. Soc. Brit. Ent., vol. 3: pp.51-53. 15 Mar. 1949.

307. Dannreuther, T., "Records of Heliothinae (Lep.) observed in the British Isles during 1945-48." Journ. Soc. Brit. Ent., vol.3: pp.53-58. 15 Mar. 1949.

308. Darlow, H.M., "Insects Taken at Sea, August to October, 1947." Entomologist, vol.81: pp.158-163. July 1948.

309. Dethier, V.G., "Life history of Hesperia leonardus Harr." Bull. So. Cal. Acad. Sci., vol.47: pp.1-2, 2 figs. 20 July 1948. Completes description of life history. Figures pupa and larval head. [P.B.]

310. Dethier, V.G., and L.E. Chadwick, "Chemoreception in Insects." Physiol. Revs., vol.27: pp.220-254. April 1948. Review article. Covers work on olfaction and contact chemoreception, the distinction between them, and factors affecting both senses. Much work on the Lepidoptera is reviewed. [P.B.]

311. van Deurs, W., "Nye og sjaeldne Sommerfugle i 1947" [In Danish]. Ent. Meddelelser, vol.25: pp. 212-213. 15 June 1948. New records for Denmark. [P.B.]

312. Diakonoff, A., "Case-bearing Lepidoptera II (10th Paper on Indo-Malayan and Papuan Microlepidoptera)." Treubia, vol.19: pp.177-182, 2 figs, 2 pl. May 1948. Describes as new Hypophrictis saprophaga (E. Sumatra); describes larva and pupa. Larvae saprophagous, living at first in bumble-bee nests. Lists congeneric spp., with range and notes on larval habits. [P.B.]

313. Diakonoff, A., "Microlepidoptera of the Wissel Lakes, West New Guinea, II." Treubia, vol.19: pp. 183-195, 4 figs., 3 pls. May 1948. Describes as new the following spp. (new genera, all monotypical, in capitals): (Tortricidae) Zacorisca helminthophora; (Eucosmidae) ALLODAPELLA daemonia, Peridaedala hagna; (Carposinidae) Meridarchis monopa; (Gelechiidae) NEOLECHIA gamma; (Cryptophasidae) Cryprophasa psiloderma, C. proleuca, STACHYNEURA iostigma, Agriophara asaphes; (Schreckensteiniidae) EUDAEMONEURA lecithochra. Figures head and venation of new genera, and ♂ genitalia of all new spp. except M. monopa. Discusses several other species of micros; all from W. New Guinea. [P.B.]

314. Diakonoff, A., "Fauna Buruana. Microlepidoptera II." Treubia, vol.19: pp.197-219, 28 figs. May 1948. Describes as new the following spp., all from Buru (new genera, monotypical, in capitals): (Glyphipterygidae) CERCOSIMMA electrodes (also Celebes), Hilarographa ludens, Imma iota, Phycodes merosa, Anthophila macropa, Glyphipteryx metron, G. monodonta; (Copromorphidae) PSYGMOMORPHA trisecta; (Cosmopterygidae) Pyroderces resoluta; (Cryptophasidae) Acria psathyra, Odites duodaca; (Schreckensteiniidae) Stathmopoda divisa, S. triplex, S. bicycla, Thrambeutis melanocephala; (Orneodidae) Orneodes fumosa; (Plutellidae) Anaphantis aurifraga; (Lithocolletidae) Catoptilia daedala, Opogona glaphyra, O. gymnota; (Tineidae) Hypophrictis dichorrhaga. Figures head and venation of new genera and genitalia of new spp. Lists other spp. taken on Buru, with synonymy and range.[P.B.]

315. Diakonoff, A., "Notes on synonymy of some South Asiatic Microlepidoptera". Bijdr. tot Dierkunde, vol.28: pp.133-139. 1949. The following synonymy is given: Phaloniidae: Clysiana opistodonta Diak.= C. reliquatrix Meyr.; C. reliquatrix Diak. nec. Meyr. = C. tenggerensis Diak. (nom.nov.). Tortricidae: Zacorisca stephanitis Meyr. = Z. taminia Feld.; Terthreutis duosticta Wilem. and Stringer = T. sphaerocosma Meyr.; Amniodes Meyr. = Terthreutis Meyr.; Rhapsodica Meyr. (Xyloryctidae) = Leontochroma Wals. Eucosmidae: Eucosma brachyptycha Meyr. and Idiographis zophocosma Meyr. = Cryptaspasma lugubris Feld.; Eucosma leucaspis Meyr., Platypeplus rhynchias Meyr. and Argyroploce peltastica Meyr. = A. discana Feld.; A. heteraspis Meyr. = A. simeiculta Meyr.; A. philocompsa Meyr. = A. harmonica Meyr.; A. tetraploca Meyr. = A. strepsibathra Meyr.; A. onychosema Meyr. = A. confertana Walk.; A. hydrargyra Meyr. = A. herbifera Meyr.; A. conchifera Meyr. = A. albitibiana Snell.; Eucelis ochreoceroina Wals., Eucosma trophiodes Meyr. and E. melanaula Meyr. = E. falcana Wals.; Procoronis rhotias Meyr. = P. swinhoeana Wals.; Laspeyresia cymbalora Meyr. = Enarmonia novarana Feld.; Laspeyresia ptychora Meyr. = Enarmonia pseudonectis Meyr.; Laspeyresia haemographa Meyr. = Enarmonia delectana Snell; E. koenigiana Fabr., a distinct species; Laspeyresia exemplaris Meyr. = Enarmonia hemicosma Low. Glyphipterygidae: Irianassa alcyonopa Meyr. = I. speciosana Pag.; Simaethis nubicincta Meyr. = Imma mormona Meyr.; Badera prodigella Walk. = Tortyra divitiosa Walk.; T. beryllitis Meyr. = T. pretiosa Walk.; Simaethis pilaria Meyr. = Anthophila dichlora Meyr. [A.D.]

316. Dillon, Lawrence S., "The Tribe Catagrammini (Lepidoptera: Nymphalidae). Part I. The Genus Catagramma and Allies." Sci. Pub. Reading Pub. Mus. and Art Gallery, no.8: 113 pp., 14 pls. 3 Sept. 1948. Describes as new: PAULOGRAMMA (type C. pyracmon); CATACORE (type C. kolyma); P. peristera piraya (Argentina); Catagramma hydaspes peregrinata (Peru); C. h. dubiosa ("Amazon"); C. aegina sticheli (Honduras); C. mengeli (Peru); C. mionina acreensis (Brazil); C. atacama amastris (Colombia); C. a. bassleri (Peru); C. felderi peruviensis (Peru); C. cyllene madebrensis (Brazil); C. levi (Peru); C. hystaspes cuyaba (Brazil); C. h. macrifasciata (Brazil); C. cynosura fulva (Brazil); C. astarte astartoides (Bolivia); C. a. staudingeri (Venezuela); C. selima goyazae (Brazil); C. s. reflexa (Brazil); C. s. lilliputa (Colombia); C. excelsior micheneri (Colombia); C. e. uaupensis (Brazil). Covers 101 forms in the three genera; figures almost all. [P.B.]

317. Dowdeswell, W.H., and E.B. Ford, "Butterfly Migrations Noted in the Isles of Scilly in 1947." Entomologist, vol.81: p.141. June 1948.

318. Downes, J.A., "The history of the speckled wood butterfly (Pararge aegeria) in Scotland, with a discussion of the recent changes of range of other British butterflies." Journ. Anim. Ecol., vol.17: pp. 131-137, 1 fig. Nov. 1948. Reports range changes of this and other spp. during the last century. Concludes that in view of these rapid changes zoogeographical theories based on the British butterfly fauna cannot be firmly established. [P.B.]

319. Easton, Nigel T., "Pieris napi, L. ab. rotunda, ab.nov." Ent. Rec. Journ. Var., vol.60: pp.121-122. Dec. 1948. Genetic form, with abnormal wings and reduced viability. [P.B.]

320. Fearnehough, T.D., "Colour Variation in Pupae of Euphydryas aurinia." Ent. Rec. Journ. Var., vol.60: pp.88-89, 1 pl. July/Aug. 1948. Describes differences between specimens pupating in dark and in light. [P.B.]

321. Fernández, Ambrosio, "Contribucion al conocimiento de la biologia del lasiocampido Chondrostega vandalicia Mill. (Lepidop. heteroc.), y descripcion de una forma nueva" [In Spanish]. Rev. R. Acad. Cien. Madrid, vol.42: pp.117-121. 1948. Discusses range and life history; names one aberration. [P.B.]

322. Evans, W.H., "Revisional Notes on African Hesperiidae." Ann. Mag. Nat. Hist.,(ser.11) vol.13: pp. 641-648, 1 fig. 8 Jan. 1947. Describes as new: Coeliades keithloa lorenzo (Delagoa Bay); C. k. merva (Kenya); Eagris notteana knysha (Cape of Good Hope); Sarangesa lucidella helena (Abyssinia); Abantis paradisea meru (Kenya); Astictopterus stellata amania (Usambara); Ampitlia capenas blanda (N. Rhodesia); Gorgyra pan (Usambara); Ceratrichia argyresticta enta (Uganda); C. bonga (Usambara); Andronymus neander torosa (Uganda); A. gander (Uganda); Gretna waga bugoma (Uganda); Parnara guttana (Usambara). Notes on other forms. [P.B.]

323. Fernández, Ambrosio, "Rectificaciones y datos nuevos acerca de la biologia del lepidoptero Thaumatopoea herculeana Rmbr." [In Spanish]. Rev. R. Acad. Cien. Madrid, vol.42: pp.303-308. 1948.

324. Fife, L. Courtney, "Studies of the Diapause in the Pink Bollworm in Puerto Rico." U.S.D.A. Tech. Bull. no.977: 26 pp., 7 figs. Jan. 1949. Stimuli for initiation and termination of diapause are drought and moisture respectively, but genetic control also exists. [P.B.]

325. Fisher, R.A., and E.B. Ford, "The spread of a gene in natural conditions in a colony of the moth Panaxia dominula L." Heredity, vol.1: pp.143-174, 2 figs. 1948. Statistical analysis of changes in frequency of a gene affecting wing pattern in a local population over a period of years. The authors believe that their results are inconsistent with the view that random fluctuations in gene frequency in small populations are of evolutionary significance; but see Wright's criticisms(Evolution,vol.2). [P.B.]

326. de Fluiter, H.J., "Een belankrijke publicatie over de Nonvlinder" [In Dutch]. Ent. Berichten, vol.12: pp.364-371,383-390,401-406. 1,21 May, 1 July 1949. Lymantria monacha. [P.B.]

327. Franklin, Henry J., "Cranberry Insects in Massachusetts." Mass. Agr. Exp. Sta. Bull., no.445: 64 pp., 4 pls., 68 figs. 1948. 18 spp. of Lepidoptera discussed and figured, some in color. Practical keys to insects attacking cranberry. [P.B.]

328. Gardner, J.C.M., "On larvae of the Noctuidae (Lepidoptera) - IV." Trans. Roy. Ent. Soc. Lond., vol. 99: pp.291-318, 3 figs. 30 Sept. 1948. Conclusion of a series giving keys for some Indian spp. [P.B.]

329. Ghélélovitch, Sabbas, "Coelogregarina ephestiae, Schizogrégarine parasite d'Ephestia kühniella Z. (Lépidoptère)" [In French]. Arch. Zool. Expér.Gén., vol.85: N and R pp.155-168, 1 fig. 30 Apr. 1948. Morphology, life history, systematics. Original generic name, Coelocystis, preoccupied. [P.B.]

330. Gladman, John C., "Additional Notes on Arakan Butterflies." Journ. Bombay Nat. Hist. Soc., vol. 48: pp.379-380. Apr. 1949.

331. Goldschmidt, R., "A Note on Industrial Melanism in Relation to Some Recent Work With Drosophila." Amer. Nat., vol.81: pp.474-476. Nov.-Dec.1948. Suggests that melanism is linked genetically to toleration of large amounts of metal salts in larval food. [P.B.]

332. Gorter, A.J., "Nachtvlinders op bloeiende Epilobium" [In Dutch]. Ent. Berichten, vol.12: p.380. 21 May 1949.

333. Hackman, Walter, "On the Systematics of the Coleophorid Moths" [In Swedish, summaries in Finnish and English]. Ann. Ent. Fennici, vol.14, suppl.: pp.69-74. 1949. Outlines classification based on ♂ genitalia, biology, and habitat. [P.B.]

334. Heller, J., and W. Świechowska, "Investigations on insect metamorphosis, Part XIII. The macroscopical aspect of metamorphosis." Zool. Polon, vol.4: pp.73-82. 1948. Deilephila euphorbiae: changes in relative proportions of various tissues. [P.B.]

335. Hellman, E.A., "Beobachtungen über die Grossschmetterlingsfauna der nächsten Umgebung von Mariehamn auf Åland in den Jahren 1941-1943" [In German]. Acta Ent. Fennica, no.6: 92 pp., 17 figs. 23 April 1948. Describes climate, physical features, and vegetation of the area; gives an annotated list of 448 spp. [P.B.]

336. Hinton, H.E.,"The dorsal cranial area of caterpillars." Ann. Mag. Nat. Hist.(ser.11),vol.14: pp.843-852, 6 figs. 16 July 1948. Discusses the external and internal cleavage lines on the head capsule of caterpillars, as well as the adjacent sclerotized areas and the muscle insertions on them. The paper is mainly a criticism of the work of Snodgrass on the "epicranial suture" (see Lep. News, vol.1: p.82; 1947). [P.B.]

337. Hovanitz, William, "Change of Host Preference in Colias philodice." Journ. Econ. Ent., vol.41: pp. 980-981. Dec. 1948. C. p. hageni as an alfalfa pest in Colorado. [P.B.]

338. Hubault, E., "Premières états de Lithocolletis populifoliella Tr. (Lep. Tineidae)." [In French]. Rev. Franç. Ent., vol.14: pp.203-208, 8 figs. 31 Jan. 1948. Describes and figures adult, egg, and 1st instar larva; notes on biology. [P.B.]

339. Jauch, Clothilde, and Norberto Jauch, "Nosema coliadis, nueva especie de Microsporidio, parasito de la "Isoca de los alfalfares" (Colias lesbia)" [In Spanish]. Ann. Soc. Cient. Argentina, vol.145: pp.307-314, 3 pls. June 1948.

RECENT LITERATURE ON LEPIDOPTERA - cont.

340. Jones, Wyatt W., "Paraleucoptera heinrichi n.sp." Bull. So. Cal. Acad. Sci., vol.46: pp.122-123, 4 figs. 20 Apr. 1948. Type locality Palo Alto, Calif. Figures wing and male genitalia of this species and the related P. albella. [P.B.]

341. Kaisila, Jouko, "Some special chorological features of the lepidopterous fauna of Aunus [In English, Finnish summary]. Ann. Ent. Fennici, vol.14, suppl: pp.92-98, 9 maps. 1949. Zoogeography of the Aunus fauna, with illustrations from the Macrolepidoptera. [P.B.]

342. Kalshoven, L.G.E., "De plagen der cultuurgewassen in Indonesie" [In Dutch]. Vol.1, 512 pp., 298 figs. 8 plates. W. van Hoeve, The Hague, 1950. A richly illustrated handbook on crop pests in Indonesia. Deals with the following Lepidoptera: Hepialidae, Cossidae, Squamuridae, Microlepidoptera, Pyralidae, Thyrididae, Psychidae, Limacodidae and Epipyropidae. [A.D.]

343. Karpinsky, Jan Jerzy, "Nouvelles espèces d'insectes citées pour la faune de Bologne et nouvelles localités des espèces rares trouvées dans le Parc National de Białowieża et dans la Fôret de Białowieża" [In Polish, French summary]. Frag. Faun. Mus. Zool. Polonici, vol.5: pp.309-315. 15 Sept. 1948. Includes 12 Lep., none new to Poland. [P.B.]

344. Knowlton, G.F., and W.P. Nye, "Insect Food of the Vesper Sparrow." Journ. Econ. Ent., vol.41: p.821. Oct. 1948. Lists some Lepidoptera. [P.B.]

345. Koch, M., "Las Zygaena españolas del Instituto de Entomologia de Madrid. (Lep. Zygaen.)" [In Spanish]. Eos, vol.24: pp.319-333. 31 Oct. 1948. Describes as new Zygaena nevadensis guadalupei (Guadalupe, Spain). Discusses the species purpuralis, scabiosae, achilleae, nevadensis, and sarpedon and their races in Spain. No figures. [P.B.]

346. Kowarzyk, H., and J. Rymar, "The experimental aberrations of Vanessidae." Zool. Polon., vol.4: pp.83-106, 2 pls. 1948. Experimental modification of Vanessa urticae wing pattern by injection of heavy metal compounds. [P.B.]

347. Kozhantshikov, I.V., "Zimovka i diapausa cheshuekrylykh nasekomykh Sem. Orgyidae (Lepidoptera, Insecta) [Hibernation and diapause of Lepidoptera of the family Orgyidae; in Russian]. Isvest. Akad. Nauk SSSR, Ser. Biol., 1948: pp.653-673.

348. Kudla, Miloslav, "Doplněk ku článku 'Lepidopterologický průzkum Olomoucka'" [In Czech.]. Acta. Soc. Ent. Čechosloveniae, vol.46: pp.62-65. 1 Feb. 1949.

349. Kurentsov, A.I., "K zoogeografii ostrova Sakhalina" [In Russian; Contributions to the zoogeography of the island of Sakhalin]. Doklady Akad. Nauk. SSSR, vol.60: pp.1405-1408. 1948.

350. Lee, Helen Tsui-ying, "A Comparative Morphological Study of the Prothoracic Glandular Bands of Some Lepidopterous Larvae with Special Reference to their Innervation." Ann. Ent. Soc. Amer., vol.41: pp.200-205, 1 pl. June 1948. Covers 13 spp. Suggests that these are endocrine glands, which has been confirmed since this paper was written. [P.B.]

351. Lempke, B.J., "De geografische variabiliteit van Philudoria potatoria L. in Nederland (Lep., Lasiocampidae)" [In Dutch; Geographical variability of Ph. p. in the Netherlands]. Bijdr. tot Dierkunde, vol.28: pp.299-307, 1 map, 4 tables. 1949. Two subspecies of this lasiocampid appear to occur in Holland, the "Dactylis race" preferring hairy grasses and inhabiting higher grounds while "Phragmites race" preferring reed and living in lowlands. [A.D.]

352. de Lesse, H., "Nouvelle note sur Gegenes pumilio Hffsgg." [In French]. Rev. Franç. Lépid., vol.11: pp. 229-230. 22 Jan. 1948.

353. Levett, R.J.R., "Butterfly Collecting in Balcombe and East Sussex in 1947." Ent. Rec. and Journ. Var., vol.60: pp.95-97. Sept. 1948.

354. de Lucca, C., "Some Species of Crambidae (Lepidoptera, Heteroneura, Pyralina) Observed in Malta." Entomologist, vol.81: p.228. Oct. 1948.

355. MacGillavry, D., "Een kleine vaarneming bij Vanessa atalanta L." [In Dutch]. Ent. Berichten, vol.12: p.453. 1 Dec. 1949.

356. Manunta, Carmina, "Nitrogen metabolism in silkworms (Bombyx mori)." Proc. 8th Int. Genet. Congr., pp.624-625. 1949. Abstract.

357. Maňan, Josef, "Beauveria Brumpti Langeron (1934) comme parasite des insectes" [In Czech, French summary). Acta Soc. Zool. Čechoslovenicae, vol.12: pp. 89-96. 1948. Records Ephestia kühniella and other insects as hosts of this fungus. [P.B.]

358. Mason, Horatio, C., "Chremylus rubiginosus (Nees.), a Braconid Parasite of the Casemaking Clothes Moth." Ann. Ent. Soc. Amer., vol.41: pp.28-40, 5 figs. Mar. 1948.

359. Michelbacher, A.E., W.W. Middlekauff, and N.B. Akesson, "Caterpillars Destructive to Tomato." Calif. Agr. Exp. Sta. Bull., no.707: 47 pp., 19 figs. May 1948. 8 spp. discussed. [P.B.]

360. Michener, Charles D., "Sympatric Species of Calisto in Cuba (Lepidoptera, Satyrinae)." Am. Mus. Novitates, no.1391: 3 pp., 2 figs. 10 Jan. 1949. Describes as new C. bruneri (Oriente); figures this sp. and the sympatric C. herophila. [P.B.]

361. Mikulski, J.S., "Studies in thermal ecology of insect pupae. I. Pupae of Malacosoma neustria L. and Euproctis chrysorrhoea L." Bull. Int. Acad. Polonaise Cl. Sci. Math. Nat. BII 1948: pp.109-115. 1948. Effects of constant and varying temperatures on length of pupal stage. [P.B.]

362. Musgrave, A., "Some Butterflies of Australia and the Pacific. Family Danaidae - Danaids I." Australian Mus. Mag., vol.9: pp.270-275, 10 figs. 30 Sept. 1948. Brief account of several spp. of Danaus and Euploea. [P.B.]

363. Nickels, C.B., "Cameraria caryaefoliella, a Pest on Pecan." Journ. Econ. Ent., vol.41: p.114, 2 figs. Feb. 1948.

364. Notley, F.B., "The Leucoptera Leaf Miners of Coffee on Kilimanjaro. I. Leucoptera coffeella, Guér." Bull. Ent. Res., vol.39: pp.399-416, 10 figs. Dec. 1948. Life history, parasites. [P.B.]

365. Nüesch, Hans, "Entwicklungsgeschichtliche Untersuchungen über die Flugelreduction bei Fumea casta und Solenobia triquetrella (Lep.) und Deutung der Solenobia-Intersexen" [In German]. Arch. Julius Klaus-Stiftung, vol.22: pp.221-293, 28 figs. 15 Feb. 1948. Describes wing development in Fumea and Solenobia and in intersexes of the latter. [P.B.]

366. Nunberg, Marian, "Second contribution to the knowledge of the native insects, mining the leaves" [In Polish, English summary]. Frag. Faun. Mus. Zool., Polonici, vol.5: pp.185-197. 28 Feb. 1948. Lists 87 spp., including 27 Lepidoptera. [P.B.]

367. Osborn, Herbert, Neale Howard, C.R. Neiswander, N.D. Blackburn, C.R. Cutright, T.H. Parks, R.B. Neiswander, and J.B. Poliuka, "Recent Insect Invasions in Ohio." Ohio Biol. Survey Bull., no.40: pp. 357-385, 8 figs. Jan. 1948. Reports distribution, spread, and habits of a number of insects, including Pyrausta nubilalis and Grapholitha molesta. [P.B.]

368. Park, Orlando, "Observations on the Migration of Monarch Butterflies through Evanston, Illinois in September 1948." Chicago Acad. Sci. Nat. Hist. Misc. no.30: 8 pp., 2 figs. 21 Oct. 1948.

369. Parsons, Arthur C., "The Polyphemus Moth." Natural History, vol.58: pp.78-81, 9 figs. Feb. 1949. Good figures of wing expansion in emerging Telea polyphemus. [P.B.]

370. Peltonen, Osmo, "Die Raupe von Catocala adultera Mén. (Lep., Noctuae) aufgefunden" [In Finnish, German summary]. Ann. Ent. Fennici, vol.14: pp.120-121. 30 Dec. 1948. Describes larva, from Populus tremula. [P.B.]

371. Petersen, Bjorn, "Views on the study of geographic variation" [In English, Finnish summary]. Ann. Ent. Fennici, vol.14, suppl.: pp.181-186, 3 figs. 1949. Discusses the analysis of variation of individual characters, with examples mainly from Argynnis aphirape. Points out that variation of different characters need not coincide geographically; therefore the study of this variation is more important for understanding of evolution than study based on artificial "subspecies". [P.B.]

372. Polonovski, Michel, and René-Guy Busnel, "Sur un pigment à fluorescence bleue des oeufs de Bombyx mori" [In French]. C. R. Acad. Sci., vol.226: pp. 1047-1048. 22 Mar. 1948.

373. de Puységur, K., "Lycaena (Heodes) dispar s. sp. burdigalensis D. Lucas dans le Lot-et-Garonne" [In French]. Rev. Franç. Lépid., vol.11: pp.294-295. 20 Apr. 1948.

374. Rawson, George W., and J. Benjamin Ziegler, "A new species of Mitoura Scudder from the Pine Barrens of New Jersey (Lepidoptera, Lycaenidae)." Journ. N. Y. Ent. Soc., vol.58: pp.69-82, 11 figs. June 1950. Describes as new Mitoura hesseli from Lakehurst, New Jersey, distinguishes it from M. gryneus, and figures both insects together with their genitalia. Holotype and allotype in the U.S. National Museum. Points out that gryneus is valid name for insect now going under name damon. [C.dP.]

375. Rimsky-Korsakov, M.H., "Nekotorye Nabliudeniia nad Faunói Nasekomykh Zapovednika 'Borovoe' v Kazakhstane" [In Russian; Some observations on the insect fauna of "Borovoe" national park in Kazakhstan]. Ent. Obozrenie, vol.30: pp.148-153. 1948.

376. Roney, J.N., "The Beet Armyworm on Flax." Journ. Econ. Ent., vol.40: pp.931-932. Dec. 1947.

377. Schramm, Wiktor, "Lepidoptera in the Olchera Region of the Sanok District Collected over a Period of 50 Years" [In Polish, English summary]. Poznan Soc. Friends Sci., Publ.Math. Nat. Hist. Sect., vol. 10: pp.269-313. 1948. An annotated list of over 550 Macrolepidoptera from this region. [P.B.]

378. Schuh, Joe, and Don C. Mote, "The Oblique-banded Leaf Roller on Red Raspberries." Oregon Agr. Exp. Sta. Tech. Bull., no.13: 43 pp., 12 figs. 1948. Biology and control of Archips rosaceana. [P.B.]

379. Schwanwitsch, B.N., "Evolution of the Wing-Pattern in Palaearctic Satyridae. IV. Polymorphic Radiation and Parallelism." Acta Zoologica, vol.29: pp.1-61, 263 figs. 1948. Summarizes his previous work on 9 Palearctic genera, discussing the fate of the prototypal pattern components in terms of divergent and parallel evolution. [P.B.]

380. Schwanwitsch, B.N., "O risunke kryla babochek tolstogolovok (Hesperiidae)" [In Russian; On the wing pattern of skippers]. Doklady Akad. Nauk SSSR, vol.59: pp.789-792, 9 figs. 1948.

381. Sevastopulo, D.G., "A Day's Collecting at Athi River, Kenya Colony - 15.VIII.48." Ent. Rec. and Journ. Var., vol.60: pp.97-100. Sept. 1948.

382. Simmonds, F.J., "The biology of parasites of Loxostege sticticalis in North America. IV: Cryptus inornatus Pratt (Ichneumonidae, Cryptinae)." Proc. R. Ent. Soc. Lond.(A), vol.23: pp.71-79, 11 figs. 15 Sept. 1948.

383. Slabý, Otto, "The digestion of cellulose by the caterpillars of our Cossidae and Sesiidae" [In Czech, English summary]. Acta Soc. Zool. Čechoslovenicae, vol.12: pp.184-209, 4 figs. 1948. Shows that symbiotic bacteria in proctodeum permit spp. to use cellulose as food. [P.B.]

384. Sperry, John L., "Three apparently undescribed geometrid moths from the Southwest." Bull. So. Cal. Acad. Sci., vol.47: pp.6-10. 20 July 1948. Describes as new: Chlorochlamys martinaria (Sta. Rita Mts., Ariz.); Drepanulatrix ruthiaria (Charleston Mts., Nev.); D. rindgearia (Inyo Co., Calif.). No. figs. [P.B.]

385. Stempffer, H., "Contribution à l'étude des Lycaenidae de la faune éthiopienne" [In French]. Rev. Franç. Ent., vol.15: pp.185-196, 5 figs. 28 Sept. 1948. Describes as new: Virachola lorisona form albifrons (Abyssinia); V. suk (Abyssinia); Epamera mimosae septentrionalis (Kenya); Spindasis homeyeri form fraeta (Rhodesia, Uganda, Mozambique); Axiocerces jacksoni (Somaliland); Cupidesthes irumu (Belgian Congo); Tarucus legrasi (Senegal, Nigeria, Dakar). Male genitalia of new species described and figured. Regards Epamera tajoraca haemus as probably a race of E. mimosae. [P.B.]

386. Tobias, Julian M., "The high potassium and low sodium in the body fluid and tissues of a phytophagous insect, the silkworm Bombyx mori, and the change befor pupation." Journ. Cell. Comp. Physiol., vol.31: pp.143-148. April 1948.

387. Toumanoff, Constantin, "Une épizoötie mortelle chez les chenilles de fausses teignes des ruches, Achroia grisella Fabr. et Galleria mellonella L., due à Coelogregarina ephestiae Ghel." [In French]. C. R. Acad. Sci., vol.227: pp.1274-1276. 8 Dec. 1948. Suggests infection may be carried by the chalcid parasite Dibrachys boucheanus. [P.B.]

388. Turcek, Frank J., "Birds in an Oak Forest during a Gypsy Moth Outbreak in South-Slovakia." Amer. Midland Nat., vol.40: pp.391-394. Sept. 1948. Reports concentration of birds in area and rates importance of various species as predators on the larvae. [P.B.]

389. Viette, P., "Contribution à l'étude des Hepialidae (Lep.). 5eme Note. Quelques Hepialidae d'Indo-Chine" [In French]. Notes Ent. Chinoise, vol.12: pp.83-86, 2 figs. 15 Oct. 1948. Describes as new PROCHARGIA, with type P. coomani n.sp. (Tonkin). Venation and genitalia figured. [P.B.]

390. Viette, P., "Les Ophideres du Pacifique (Lepid. Noctuidae)." [In French]. Rev. Franç. Ent., vol. 15: pp.209-220, 14 figs. 15 Dec. 1948. Places the three Pacific species in the genera Eumaenas (O. saliminia) and Othreis (O. fullonia, O. materna). Gives a key to the species and describes them thoroughly, with figures of genitalia, etc. A complete bibliography is given. [P.B.]

391. Waloff, N., "Development of Ephestia elutella, Hb. (Lep., Phycitidae) on some Natural Foods." Bull. Ent. Res., vol.39: pp.117-130, 4 figs. May 1948.

392. Walton, R.R., and G.A. Bieberdorf, "The Southwestern Corn Borer and Its Control." Okla. Agr. Exp. Sta. Bull., no.321: 23 pp., 14 figs. June 1948. Range, morphology, and biology of Diatraea grandiosella. [P.B.]

393. de Wilde, J., "Contribution to the Physiology of the Hearts of Insects, with Special Reference to the Alary Muscles." Arch. Néerland. Physiol., vol.28: pp.530-542. 10 Jan. 1948. Studies of the contraction and irritability of the alary muscles in several Lepidoptera and other insects. [P.B.]

394. de Worms, C.G.M., "British Lepidoptera Collecting, 1947." Entomologist, vol.81: pp.118-122, 137-140, 153-157. May, June, July 1948.

NOTICES BY MEMBERS

All members may use this column to advertise their offerings and needs in Lepidoptera. There is no cost for this service. Unless withdrawn sooner by the member, each notice will appear in THREE issues.

AMAZON BUTTERFLIES from Santarém, Obidos, Manaos, and Tefé. Young Swiss on collecting trip wishes to sell his duplicates to help defray expenses. Will be on home leave in Switzerland from December 1950 on. Please let me know your wishes. Jorge Kesselring, Weinbergstr. 166, Zürich 6, SWITZERLAND.

For sale: Complete set of BULL. LEP. SOC. JAPAN, vol.1, nos.1,2,3, and 4 (108 pp.)(1946) - 70 cents, including postage. Hiroshi Inoue, 290 Miyamae, Okamachi, Minami-ku, Yokohoma, JAPAN.

Butterflies from ECUADOR and ARGENTINA. If you are interested as an amateur or a specialist in material collected by William Clark-Macintyre in Ecuador or Juan Foerster in Argentina and Paraguay, write for information and price-lists from F.M. Brown, Fountain Valley School, Colorado Springs, Colorado.

Duplicates of many groups of insects for exchange (full data, papered), from Panama, Cuba, Japan. Large number of Japanese Lycaenidae. Desire tropical Lycaenidae, esp. from remote countries; list made up on request. Raymond Jablonski, 920 E. Knapp St., Milwaukee 2, Wisconsin.

Pinned Catocala from Big Horn Mountain region for exchange. Duke Downey, 51 West 4th St., Sheridan, Wyoming.

SPEYERIA specialists! Rare endemic species from Atlas Mts. of Morocco, S. (Argynnis) lyauteyi Obth. 2♂♂ 1♀ $5.00, ♂♂ $1.50 each. Also many other rarities - Satyrus abdelkader, S. atlantis (mniszechii), Epinephele maroccana, Coenonympha vaucheri, C. fettigii, Cigaritis allardii, Heodes alciphron herakleana, H. phoebus, etc. Exchange for arctic U.S. Rhopalocera also considered. Colin W. Wyatt, Cobbetts, Farnham, Surrey, ENGLAND.

For exchange: The Periodic Cicada, Tibicina septendecim, with all data, for Lepidoptera, particularly Papilionidae and Sphingidae. Large number of cicadas available. Will also sell. J.W. Morris, 2704 W. Genesee St., Syracuse 9, New York.

For sale: Rhopalocera from Africa. Have Papilio, Charaxes, and other genera. Send for list. Prices are low. Charles Seydel, B.P. #712, Elisabethville, Belgian Congo, AFRICA.

For sale: insect pins, excellent quality, made in Austria. Sizes 2,3, and 4. 55¢ per 100 of a size, $4.00 per 1000 of a size. Limited supply on hand, order early. Leonard S. Phillips, 1839 S. Hamlin Ave., Basement Apt., Chicago 23, Illinois.

Wanted: ENTOMOLOGICAL NEWS, vol.2: no.10; will purchase or will give other literature in exchange. Dr. C.L. Remington, Yale Univ., New Haven 11, Conn.

Southwestern Lepidoptera for sale. Many species offered of all families of Lepidoptera, prepared as desired and with complete data. Good selection of LIVING MATERIAL available. Your special interest is my interest. Inquiries invited. Frank P. Sala, 1764 Colorado Blvd., Los Angeles 41, California.

Wanted: three volumes of Seitz' "Macrolepidoptera of the World" (English Transl.): Vol.5 - American Rhopalocera; Vol.7 - African Rhop.; Vol.9 -- Indo-Australian Butterflies. Bro. John J. Renk, Regis College, West 50th and Lowell Blvd., Denver 11, Colo.

For sale: specimens of Cisseps fulvicollis, Ateva aurea at 10¢ each, with full data. Also unnamed moths at 6¢ each; will exchange for exotic Rhopalocera with full data. James Unseld, Jr., Gravel Switch, Kentucky.

Young man, 22, seeking a position collecting, papering, or mounting entomological material. Will travel to desired localities and collect your needed species. For details write: Raymond Jablonski, 920 E. Knapp St., Milwaukee 2, Wisconsin.

Speyeria diana; have a dozen males and three females for sale or trade. What do you have to offer? Stephen B. Smalley, 6129 Glade Ave., Cincinnati 30, Ohio.

Twenty thousand California butterflies for sale. Ten for $1.00; $5.00 per hundred. Perfect condition, named. Largest of all Morphos, the Amothonte, $1.00 each. Price list free. Ben Karp, 3148 Foothill Blvd., La Crescenta, California.

Disposing of periodicals in my private library. Journ.N.Y.Ent.Soc., vols.1-57 (complete, 1893-1949)- $100; Bull. Brooklyn Ent. Soc., vols.8-28 (1912-28)- $20; Can. Ent., vols.36-45 (1906-13, 1 issue missing)- $7. W.P. Comstock, American Museum of Natural History, New York 24, N.Y.

LIVING MATERIAL

Platysamia gloveri and columbia-gloveri hybrid cocoons for sale. Good condition guaranteed. Duke Downey, 51 W. Fourth St., Sheridan, Wyoming.

LIVING COCOONS and PUPAE of giant Indian moths for sale. Living materials are always despatched by air-mail. U.S. Dept. of Agr. import permits (see Lep. News, vol.3: p.13 for directions) must accompany orders from U.S.A. Remittance must accompany all orders. Probable garden foodplants in parentheses: Actias selene (Walnut, Cherry, Hibiscus) - $0.20; Attacus atlas - .50; A. cynthia (Ailanthus)- .12; A. edwardsii -.50; Loepa katinka (Ivy, Va.Creeper) - .20; Antheraea mylitta (Oaks) - .40; A. roilley - .20; Salassa lola - .50; Brahmaea wallichi (Ash, Privet, Lilac); scarce sphingid Langia zenzeroides (Apple, Cherry, Pear) - $1.00. Fertile eggs of large stick insect (Lettuce?) -$2.00 per 100. The Himalayan Butterfly Co., Shillong, Khasi Hills, INDIA. [Prices in U.S. dollars].

QUESTIONS AND ANSWERS

Q. "Is there any published list where I can find out the type localities of North American Lepidoptera."

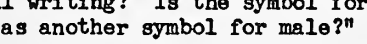
A. No. Barnes and McDunnough prepared a list about 1916, which I suppose is now in manuscript at the National Museum, and in any case exists there in the form of tickets placed with each species in the collection. But it has not been published.

Q. "Can you give me references to Papilio alcinous Donovan which Scudder mentioned in his Butterflies of the Eastern United States and Canada as a Jasoniades from Australia but very close to glaucus? I have seen no other mention of it."

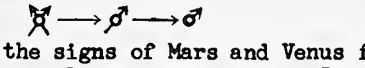
A. Papilio alcinous is a well known East Asiatic species, a black one with some resemblance to troilus in the adult, but a caterpillar feeding on the orange family like our cresphontes. It is figured in many works on exotic butterflies, for instance in the Seitz "Macrolepidoptera of the World", vol.1: pl.2, figs.a2,3. Also Leech's "Butterflies of China", and all the standard Japanese butterfly books. It does not actually occur in Australia. The larva was figured by Dyar (Proc. U.S. National Museum, vol. 28: p.938) and elsewhere.

Q. "Can you tell me the origin of the use of the symbols for Venus (♀) and Mars (♂) for designating sex in biological writing? Is the symbol for Earth (♁) used merely as another symbol for male?"

A. The symbol for female was the symbol the astrologers used for both the planet and the goddess Venus. Originally it was the hieroglyphic (Egyptian) symbol for the word ankh and the idea "life", and was actually a bow-knot, with the loops spread sideways and the two ends hanging down together. Our form of the sign goes back about to King Tutankhamen's time [1350 B.C.].



The male symbol had nothing to do with the symbol for "earth" which was a quite late invention. It was the astrologers' symbol for the planet and god Mars, and goes back to the Egyptian hieroglyph for their war-goddess Neith, which was two crossed spears behind a shield.



The use for the signs of Mars and Venus for male and female respectively was natural, but I think relatively modern.

The use of the sign of Mercury (☿) for the worker in Hymenoptera was very recent, and I think was chosen simply because it was available in type fonts and looks harmonious with the other two. Purists use the ordinary female sign instead, mutilated by leaving off the cross-piece (♀). (For termite workers ♂ = mutilated ♂.)

W.T.M. Forbes

[In the answer and the question concerning "a peculiar growth attached to the extremity of the abdomen" of Parnassius butterflies (the 'seal' or 'sphragis'), mention should have been made of the fact that it is the female which carries the sphragis. (Lep. News 4: p.16.)]

TABLE OF CONTENTS

Vol.IV, nos.4-5

A supply of reprints of the Mitoura hesseli paper (see p.42) has been sent to the News office for Society members by Drs. Rawson and Ziegler. A few copies are also available of the following paper: "English Names [Common] for Japanese Butterflies", by Tarō Iwase. U.S.A. members please send postage to cover forwarding; members outside the U.S.A. merely need to request the papers.

The annual "List of Members" of the Society for 1950 will be mailed with the next issue of the News.

THE LEPIDOPTERISTS' NEWS
Monthly periodical of The Lepidopterists' Society

Membership is open to all persons interested in any aspect of the study of butterflies and moths. The 1950 dues, including subscription to the News, are $2.00 for Regular Membership and $4.00 for Sustaining Membership. Please make remittances payable to: C.L. Remington.

The Lepidopterists' News

THE LEPIDOPTERISTS' SOCIETY
c/o Osborn Zoological Laboratory, Yale University, New Haven 11, Connecticut, U.S.A.
Editor - C. L. REMINGTON • *Assoc. Editor* - J. E. REMINGTON

Volume IV 1950 Numbers 6-7

THE MIGRATION OBSERVATION GROUP OF SWITZERLAND

by R. Loeliger
Zürich, Switzerland

[Editor's Note: Some months ago we learned of the intensive activity of a group observing migrations in Switzerland. One of the Lepidopterists' Society members, Dr. R. Loeliger, who leads the group, has been sending us regularly the monthly mimeographed circular reports, and we recently urged him to prepare an article on the activities of the group for the Lep. News. The results follow. Dr. Loeliger serves as the "Zentralstelle für die Beobachtung von Schmetterlings-Wanderflügen" (Headquarters for the Observation of Lepidoptera Migrations). The address is: "Schweizer Kamerad", Seefeldstrasse 8, Zürich 8, Switzerland. C.L.R.]

The editor has assured me that there would be among the News readers some interest in the work we do here in Switzerland to get further knowledge about the migration problems of Lepidoptera. Let me first tell you that the thorough work done in Great Britain by Dr. C.B. Williams*, of Rothamsted Station, and by Captain Dannreuther, has very much encouraged our Swiss group to do this work. Our group of observers was founded in 1946, and the organization is a very informal one. There are no statutes; there is only a leading idea: the interest in observing migrating butterflies and moths in order to know the routes they fly, and if possible the reasons why they do so. In the spring of 1946 we started with a group of only a dozen members, living in different parts of Switzerland. Since the beginning, all observations have been carefully noted and reported in machine-written circulars, at first in the German language only, and sent free of charge to all members. The members were mostly amateurs, but included trained entomologists as well.

The very first year we had the great opportunity of observing and describing in our circulars the sensational 1946 immigration of Celerio livornica throughout the country, and this occurrence has furthered our work in most decisive measure. By the beginning of 1947, our group already numbered about 60 members, and beside them there were also entomologists in other countries, who took much interest in our circulars.

Concerning the flights of Vanessa (Pyrameis) cardui or of C. livornica, it would not suffice merely to observe them passing through our country. In order to know the beginning and the end of their migrating flights, we needed to have stations in other countries too, from the coast of North Africa to the Scandinavian countries, Denmark, Sweden, and Norway. Because North Africans speak French, we had to publish our circulars in French, as well as German, which has been done since 1948.

On the other hand we found out that the only real proof of recognizing a certain individual butterfly during its migrating consisted in marking the insect, as birds are marked with rings (bands), but of course in a manner adapted to these delicate fliers. In 1947 we therefore began to mark different species of butterflies, giving them spots of lacquer colours upon their wings. In Switzerland we choose the underside of the hindwings and mark them with white, yellow, blue, red or green spots, according to the different stations in our country. The results were most discouraging, as reports of recognizing them again did not come in. Many of the marked butterflies, such as Nymphalis urticae, N. io, Vanessa atalanta, etc. could still be seen for some days in the vicinity, but then they suddenly disappeared. Similar negative results came from the experiments of entomologists in other countries, such as Austria, Germany, Holland, Denmark, and it was not until 1949 that an English entomologist had a successful marking of about 300 to 400 V. cardui, which he released on the Isle of Canna (Scotland). Half a dozen of them were recognized several days later, about a hundred miles distant, southeast of the Isle of Canna. We know of these results by correspondence only and do not know whether these experiments have been published anywhere in the meantime. In our group we had results too. In 1950 one N. urticae, marked in Berne, was recognized a little later in a village about 75 miles northeast of Berne, and one N. io marked near Basle was seen again about 10 miles south of that place.

But it is evident that the number of these results, although encouraging greatly the confidence of our group (counting now about 250 members), is not sufficient and must be somehow enlarged in the future. We therefore plan to have marking members

*See Dr. Williams' articles on migration in the Lep. News, vol.3: pp.17-18, 39-40; 1950.

Loeliger: MIGRATION OBSERVATION GROUP -cont.

in North Africa in order to mark V. cardui in spring time, before they leave the coast and fly over to Europe. If only one of these quick migrators is recognized anywhere in Europe, it will be the first real proof that a known butterfly specimen has flown the distance from the start where it was marked to the station where it has been recognized. For now, if we see V. cardui fly through our country, we can presume only that they might come from the far south but it might also be that the cardui coming from Africa only fly a certain distance and then are relieved by others which were already further north, and these again by others, and so on. The whole flight of perhaps 1000 miles might consist of different parts of flights of only about 200 to 300 miles each. If the insects are not marked, nobody can find out whether they are specimens coming from as far as 1000 miles.

Everyone will obviously conclude that there is much work to be done. If any reader of these lines, living in the region of our observations, and being interested in these problems of migration of Lepidoptera, will join our ranks he may address himself either to the Lep. News editor, who will forward it to us, or to the writer directly. He will receive our circulars regularly, and may be assured that his help is very much appreciated.

AMERICAN MOTHS IN BRITAIN

Dr. C.B. Williams, Head of the Dept. of Entomology of Britain's great Rothamsted Experimental Station, recently wrote of the rather surprising captures of two American species of moths in Great Britain. His son, M.C. Williams, caught one specimen of the pink diurnal arctiid, Utetheisa bella (L.), on Skokholm Island, Pembrokeshire, Wales, in August 1948. The next year Dr. Williams took a specimen of the noctuid, Raphia frater Grote, in a light trap at Harpenden, Herefordshire, England, on July 3rd. He adds: "There is of course no clue as to how either of them got here!"

ADDITIONS TO "THE BUTTERFLIES OF GEORGIA"

After receiving a copy of "Butterflies of Georgia" [see Lep. News, vol.4: p.42] I sent Lucien Harris, Jr., a list of species taken by me in John Abbot's old hunting grounds (Screven Co., Georgia) from March to September, 1946. At his request I am sending this abbreviated list for publication.

Thorybes confusis Bell
Erynnis brizo somuus Lint.
Erynnis baptisiae Forbes
Hesperia meskei Edw.
Atrytone arogos Bdv. and Lec.
Atrytone palatka Edw.
Atrytone berryi Bell
Amblyscirtes alternata G. and R.
Amblyscirtes carolina Skin.

Otto Buchholz
Roselle Park, N.J.

HÜBNER'S "FLORIDA"

Jacob Hübner gave the locality "Florida" or "Florida in Georgia" for some of his species the specimens of which were presumably received from John Abbot. In 1763 the northern border of Florida, then English, was the Altamaha River. In 1783 Florida was returned to Spain and the northern border (definitely fixed in 1795) became lat.31° N. and the lower St. Mary's River.

After Florida was returned to Spain the Spaniards made it very uncomfortable for the English, and it is most unlikely that Abbot ever ventured into the area. The "Florida" referred to by Hübner was undoubtedly the region between the Altamaha and St. Mary's Rivers, or "Florida in Georgia," not the present Florida.

It is worthy of note that several of Hübner's species -- Calanus, Gema [= gemma], Gorgonia, Melinus, and Niphon -- are listed by Johan Karl Megerle in 1804 (Catalogus insectorum quae Viennae Austriae ...distrahuntur, Nos.1-11, 1801-1805) as identified under those names by Ziegler, and with the locality "Ex Georg[ia]." Megerle's specimens probably came indirectly from Abbot. As Hübner used Ziegler's names listed by Megerle, it is possible his specimens were received from Megerle. The names, being nomina nuda, are of no taxonomic interest, but the locality, Georgia, fixes the type locality. In 1803 Megerle listed Andromacha M. This is probably Hübner's Andromacha, and was presumably from Georgia. The specimen figured could well have come from Georgia.

Austin H. Clark
Washington, D.C.

Entomologisches Nachrichtenblatt commenced in the spring of 1947, with Herr Adrian J. Lüthi, Burgdorf, Switzerland, as editor and publisher. [See Lep. News, vol.2: p.78; 1948]. A monthly mimeographed periodical primarily for the field entomologist, it has always featured a variety of authors from several countries. Beginning with the issue of August 1950, it became in part the official organ of the Arbeitsgemeinschaft österreichischer Entomologen, of Vienna, which had been issuing the short-lived Wiener Entomologisches Rundschau. At that point mimeographing and the 30 x 21 cm. size were replaced by type-set printing and 15.75 x 23.65 cm. size. The Rundschau and the Nachrichtenblatt, combined, now bear the title ENTOMOLOGISCHES NACHRICHTENBLATT Osterreichischer und Schweizer Entomologen, with the numbering and pagination precisely continuing where the Rundschau ended (Vol.2: p.45). Thus, the last mimeographed number of E.N.B. was Vol.4, no.4 (July 1950), with pp.28-35, and the first type-set number was Vol.2, no.3 (Aug. 1950), which has pp.46-68. The new style is of course better looking and permits good illustrations, as the first article, "Der Kopulationsapparat der Schmetterlinge und seine Bedeutung für die Systematik", by Wilhelm Kühnelt, shows. We wish Herr Lüthi and the A.O.E. success in the new merger of Swiss and Austrian entomologists.

C.L.R.

THE AMERICAN PAPILIOS

(continued from page 41)

by F. Martin Brown
Colorado Springs, Colorado

SECTION II - The FLUTED Papilios

This is by far the largest and most widely distributed section of the American Papilios. It is found everywhere except in the Antarctic. There is no clear-cut division among the species of FLUTED Papilios as there is among those belonging to the ARISTOLOCHIA and KITE Papilios. Because of this it is difficult to construct a key for the two subsections into which Rothschild and Jordan divide the FLUTED Papilios. Rothschild and Jordan say of the Subsections, "The American species fall into two Subsections, which, taken each as a whole, are characterized, the one by the prevalence of yellow colour and the softness of the costal edge of the forewing, the other by the prevalence of black on the body and wings and the hardness of the costal margin of the forewing, ... However, in the second Subsection there is a mimetic group of soft-winged species (Zagreus Group), which appears to have acquired secondarily the soft costal edge and a great amount of yellow on the wings and body." The two Subsections may be distinguished as follows:

Palpus yellow at sides; frons yellow, or with black mesial stripe, rarely all black; abdomen at least with yellow dots at sides, usually with yellow stripe or for greater part yellow ..... SUBSECTION A

Palpus with white (rarely yellow) dot, sometimes quite black; frons black, or with yellow central line, never yellow along eyes; abdomen black, or with creamy stripe, or orange-buff with black mesial stripe, never dotted with yellow or white...SUBSECTION B

SUBSECTION A OF THE FLUTED PAPILIOS

There are six rather well defined groups of species in this subsection of the Papilios in America. The majority of the Nearctic species fall here. I have found the key presented by Rothschild and Jordan adequate for separating these groups and give it here in a modified form.

1. Hindwing on underside with a subbasal and a submedian band which unite near anal angle forming large black V ..... GLAUCUS Group (III)

   No such bands 2

2. Pronotum and underside of thorax with red or orange dots; no metallic blue spots on underside of hindwing ..... ANCHISIADES Group (V)

   No red or orange spots on pronotum and underside of thorax 3

3. No metallic blue spots on underside of hindwing ..... TORQUATUS Group (VI)

   With metallic blue spots on hindwing 4

4. Abdomen entirely yellow beneath and at sides; or all black, except for a row of yellow dots situated laterally on sternites (no dots on tergites); or in case of some females abdomen black with yellow line at lower edges of tergites ..... THOAS Group (II)

   Abdomen striped with black and yellow beneath or on sides; or, black spotted with yellow on tergites 5

5. Discocellular nervules of forewing with yellow bar, at least on underside; if abdomen black with yellow dots, then two rows of dots on tergites ..... MACHAON Group (I)

   Discocellulars not so decorated; if abdomen black with yellow dots then only one row on tergites ..... TROILUS Group (IV)

I. MACHAON Group

The majority of the Nearctic species of Papilio belong to this group. Only one species, ajax Linné, extends into the Neotropics, following the mountains southward as far as Ecuador. There is some question as to how many species of this group are found in the American fauna. Rothschild and Jordan recognize six - ajax Linné, (as polyxenes Fabricius), bairdi Edwards, nitra Edwards, zelicaon Lucas, indra Reakirt, and machaon Linné.

II. THOAS Group

There are twelve species in this group. It should be considered a neotropical group that sends species into the peripheral temperate regions. Although several of the species are widespread and common, the greater number are very local and tend to be uncommon in collections. Of the species found in the Antilles, a far greater percentage are of this group than of any other group of Papilios. Only three of the twelve are not known from the Islands.

Two of the species are so close in pattern that there is no constant design-characteristic by which they can be separated. Since both are found in the United States, much of the literature confuses the two. These confusing species, thoas Linné and cresphontes Cramer, can be separated in the male sex quickly and with certainty. In cresphontes Cramer there is an open space dorsally between the claspers

that can be seen or felt; this space is closed on thoas Linné by the long, spatulate process on the tenth tergite.

The species found in the various areas are as follows:

United States: thoas, cresphontes, aristodemus Esper.
Mexico and Central America: thoas, cresphontes, ornythion, lycophron, androgeus.
Antilles: thoas, cresphontes, caiguanabus Poey, aristor Godart, aristodemus, andraemon Hübner, machaonides Esper, thersites Fabricius, androgeus, and possibly lycophron.
Tropical and subtropical South America: thoas, lycophron, androgeus.
Restricted to northern South America: homothoas Rothschild and Jordan.
Restricted to northern and western South America: paon Boisduval.

III. GLAUCUS Group

The six species are found in Central and North America. I believe that it should be considered a temperate climate group with outliers into the tropics. With the exception of glaucus-rutulus, the species are easily recognized. The two mentioned may well be nothing more than geographic subspecies of glaucus. The species in the group are:

glaucus Linné - eastern and central North America
rutulus Lucas - western North America
daunus Boisduval - western Canada south to Guatemala
eurymedon Lucas - western North America
alexiares Hopffer - eastern Mexico
pilumnus Boisduval - southern Arizona to Guatemala

IV. TROILUS Group

Structurally this small group is very close to the Anchisiades Group. The two species, troilus Linné and palamedes Drury, are easily recognized. These are insects of the southeastern part of the United States, the former extending northward to Canada, the latter westward to northwestern Mexico.

V. ANCHISIADES Group

Some of the members of this group are difficult to determine properly. This is particularly true of the species that fly in northwestern South America - anchisiades, isidorus, and rhodosticta. Some of the species at times have been erroneously associated with the ARISTOLOCHIA Papilios! In general the patterns of the individual species are quite variable. This has led to the recognition of numerous subspecies that may or may not be valid. The three confusing species from the northwestern part of South America may be separated by these characteristics:

anchisiades: generally with no "tail" on M_3, sometimes with the margin projecting at this point. Hindwing noticeably longer anteriorly-posteriorly than on either rhodosticta or isidorus.

isidorus: a distinct narrow tail on M_3; hindwing much shorter than on anchisiades; forewing below without a buffish white patch across the cell.

rhodosticta: like isidorus but with a white patch across the cell near the apex, often on both sides but always on the underside.

The areas occupied by the species are:

hyppason Cramer - all of tropical America east of the Andes
pelaus Fabricius - islands of the Greater Antilles
oxynius Hübner - Cuba
epenetus Hewitson - western Ecuador
chiansiades Westwood - upper Amazon to the foothills of the Andes
pharnaces Doubleday - tropical Mexico
erostratus Westwood - Central America
rogeri Boisduval - Yucatan and British Honduras
anchisiades Esper - all of tropical America except the Antilles
isidorus Doubleday - Panama to Bolivia along the eastern flank of the Andes
rhodosticta Butler and Druce - Costa Rica to Ecuador

VI. TORQUATUS Group

Several of the species of these tropical FLUTED Papilios are quite restricted in range and rare in collections. Of some species only males have been found. Two species, tasso Staudinger and peleides Esper are known only from the types, in the latter case only from the figure given in 1784 by Jablonsky and Herbst! Both Boisduval and Kirby suggest that peleides is synthetic and does not exist in nature. Rothschild and Jordan do not agree with this point of view. The other species in the group seem to center in southern and southeastern South America, with only torquatus ranging through most of the tropical parts of the continent. The female of torquatus is highly variable, Rothschild and Jordan recognizing five nameable forms!

The five best known species in the group are:

himeros Hopffer - southeastern Brazil
lamarchei Staudinger - northern Argentina and eastern Bolivia (males only)
hectorides Esper - southeastern Brazil and Paraguay
garleppi Staudinger - eastern foothills of Peru and Bolivia (males only)
torquatus Cramer - from Mexico to southeastern Bolivia and there eastward to the coast of Brazil

SUBSECTION B OF THE FLUTED PAPILIOS

This is a "nasty" Subsection to recognize for students not familiar with it. As has already been stated, one group in this Subsection mimics the insects of Section I. It is the Zagreus Group that makes keying Subsection B difficult. However, the yellow central line on the frons is found only in the ZAGREUS Group. That character in the key to the subsections of the FLUTED Papilios should properly place the confusing species.

The separation of Subsection B into its three groups may be accomplished by this key:

1. Frons with a central yellow line .... ZAGREUS Group (VII)

   Frons wholly black 2

2. Costal margin of forewing almost smooth, serration at most vestigial...SCAMANDER Group (VIII)

   Costal margin of forewing serrate .... HOMERUS Group (IX)

VII. ZAGREUS Group

The three species in this mimetic group are not common in collections, or, so far as my experience goes, in nature. These insects center in northwestern South America. Zagreus Doubleday is the commonest of the three and is found throughout the western periphery of the Amazon basin from Venezuela to Bolivia. Ascolius Felder is found in the wet forests from northern Panama to western Ecuador and throughout Colombia. Bachus Felder, the rarest of the three, is found in essentially the same area as is zagreus.

VIII. SCAMANDER Group

None of the four species are common in collections. I have never collected a specimen in the group myself, so I know nothing of the field behavior. Hellanichus Hewitson may represent more closely than any other species in the Subsection the ancestral form from which the Subsection developed. Hellanichus is found in Uruguay and adjacent areas in Brazil and Argentina; scamander Boisduval is found in southeastern Brazil; birchalli Hewitson comes from Panama and Colombia; and xanthopleura Godman and Salvin is known from the region around Iquitos, Peru, and the lower Rio Huallaga.

IX. HOMERUS Group

These are generally large Papilios. Some of the species are difficult to separate on the basis of pattern. Many are very rare in collections, some known only from the types. The distribution of the group is rather interesting. All of the species are found in the northern part of the American tropics, but two of the species, cleotas Gray and aristeus Cramer, also appear in southeastern Brazil with a large gap in their known distribution.

There are four species found in the Mexico-Central America subregion of the neotropics: victorinus Doubleday, cephalus Godman and Salvin, cleotas, and garamus Hübner. Of these, cephalus from Chiriquini is known only from the type; the others are not uncommon. A single rather rare species, homerus Fabricius, lives in Jamaica and possibly Hispaniola. In the northern and western periphery of the Amazon Basin are found cleotas, aristeus, warscewiczi Hopffer, and cacicus Lucas. In the same region flies the exceedingly rare euterpinus Godman and Salvin. In the dry Maranon valley of northern Peru is found judicaël Oberthür, known to Rothschild and Jordan only from the type. As has been pointed out, cleotas and aristeus are found in southeastern Brazil in addition to their northwestern range.

SECTION III - The KITE Papilios

A great variety of shape and pattern is exhibited by the American members of the KITE Papilios. This diversity is greater than is found in any of the other faunal regions, and the two divisions into which the KITES are divided are not so clear-cut in America as elsewhere. The two types of hindwing, the triangular, long-tailed kind and the rounded, tailless kind, are connected by a third form in the Americas which is closer to the rounded group in shape, but bears long, slender tails. Several members of the KITES show a modification of the normal Papilio neuration in the forewing. On these the first (or first and second) radial branches fuse with the subcostal. In one case, bellerophon, the first radial is lost entirely. This is the only example of a true Papilio with a reduction in nervules. The presence in America of neurational types of KITES that are both more "primitive" and more "modern" than any found in the Old World poses interesting problems for the student of Papilio phylogeny.

The two subsections of the KITES may be separated by the following key:

Underside of wings with red spots at base, or, hindwing with red line parallel to abdominal margin, extending from costal margin in its basal half toward anal angle; radial branches always free ..... SUBSECTION A

Underside with no red or tawny band or spots on hindwing, or, with a red or tawny band across disc parallel to distal margin; radial branches either free or the first, or first and second, anastomosed with subcostal ..... SUBSECTION B

SUBSECTION A OF THE KITE PAPILIOS

The species of this Subsection are divided among three groups. Two of these, the MARCELLUS Group and the PROTESILAUS Group, are the typical long-tailed, black-and-white butterflies easily recognized as KITE Papilios. The other, the LYSITHOUS Group, is quite different and its species mimic the ARISTOLOCHIA Papilios. The abdominal margin of the hindwings will give the clue to which Section a specimen belongs, the LYSITHOUS Group of the KITES or the ARISTOLOCHIA Papilios. [See the Key to the SECTIONS on page 40, above.] The three groups are easily separated by the following key:

1. Underside with red basal spots either on both wings or on hindwings ..... LYSITHOUS Group (I)

   Underside lacking red basal spots but with red line more or less parallel with abdominal margin 2

2. Red line referred to is bordered on both sides with black, at least toward costal margin .... MARCELLUS Group (II)

   Red line referred to is bordered with black on one side ..... PROTESILAUS Group (III)

I. LYSITHOUS Group

The presence of red basal spots on the underside is the distinguishing character of these mimics. Nearly every author who has written on the American Papilios has confused some of these species with the ARISTOLOCHIA Papilios. Structurally, the members of this group are very much alike. Unlike most Papilio species, here the male genitalia are so similar as to be of little or no use for taxonomic purposes. The species align themselves geographically into two groups, those found in the Central American - Andean areas and those from southeastern Brazil and adjacent areas. Only one species, pausianus, is found in both regions. Another, ariarathes, is found only in the intermediate Amazon Basin.

The species of the group by geographic areas are as follows:

Mexico: phaon Boisduval, branchus Doubleday, belesis Bates, thymbraeus Boisduval.
Central America: pausianus Hewitson, phaon, euryleon Hewitson, ilus Fabricius, branchus, belesis.
Northern Andean region: pausianus, phaon, euryleon, hipparchus Staudinger, harmodius Doubleday, trapeza Rothschild and Jordan, ilus.
Central Andean region: pausianus, harmodius, xynias Hewitson.
Amazon Basin and its periphery: ariarathes Esper.
Southeastern Brazil and adjacent southern areas: pausianus, microdamus Burmeister, protodamus Godart, lysithous Hübner, asius Fabricius.

II. MARCELLUS Group

There are ten species in this group. It is typically a Middle American group with outliers in the United States and South America. The species seem to me to separate well by the key published by Rothschild and Jordan. Some of the species are exceedingly common in certain regions and at the right season. In Yucatan I have dropped a net over more than a hundred specimens of epidaus at one small puddle of soapy water! Many times in Central America I have collected members of this group with a forceps rather than a net.

The distribution of the species among geographic areas is as follows:

United States: marcellus Cramer and possibly celadon Lucas.
Mexico: philolaus Boisduval, epidaus Doubleday.
Central America: philolaus, xanticles Bates, oberthueri Rothschild and Jordan, epidaus.
Antilles: marcellinus Doubleday, celadon, zonaria Butler.
Venezuela and Colombia: arcesilaus Lucas.
Southeastern Brazil: bellerophon Dalman.

III. PROTESILAUS Group

Unlike the foregoing group the members of this group are very difficult to separate on the basis of pattern. Only agesilaus is easily recognized. On this species the red line on the underside of the hindwings is bordered exteriorly with black, whereas in all others the red is exterior to the black. It is possible that there are many more than the now recognized species in this group. Almost fifty years ago Rothschild and Jordan listed nine species, several of which have many subspecies. A dozen or so additional names have been proposed for specimens that belong in the group. Unfortunately I cannot say much about these since I have seen very few of them from their type-localities. I suspect that most are at best subspecies of the species accepted by Rothschild and Jordan.

Throughout tropical America except the Antilles: agesilaus Guérin and Percheron, protesilaus Linné.
Throughout tropical South America: molops Rothschild and Jordan, telesilaus Felder.
Paraguay and southeastern Brazil: stenodamus Rothschild and Jordan, orthosilaus Weymer, helios Rothschild and Jordan.
Panama and Colombia: glaucolaus Bates.
Southeastern Ecuador: earis Rothschild and Jordan.

SUBSECTION B OF THE KITE PAPILIOS

This subsection is more cohesive than the preceding, from which it differs rather strongly in both pattern and structure. The two groups of Subsection B differ structurally and in pattern but not strikingly. The patterns of some of the species, especially in the DOLICAON Group, are quite unlike those generally found on American Papilios. The females of the species are exceedingly rare in collections. I suspect that this indicates a marked difference in the habits of the sexes. Rothschild and Jordan's key to the two groups is this:

1. Hindwing below with red or tawny line (or row of spots) parallel with distal margin; first radial of forewing free.....THYASTES Group(IV)

   Hindwing below without red line; first radial* of forewing anastomosed with subcostal* ... . DOLICAON Group (V)

---

* Rothschild and Jordan use the term "first subcostal" for first radial, and costal for subcostal in their system of vein nomenclature.

Brown: THE AMERICAN PAPILIOS - concl.

IV. THYASTES Group

The six species are not very common in collections. In the field they seem to be locally common at the proper season. The species that are recognized have the following geographic ranges:

marchandi Boisduval - Mexico to western Ecuador
thyastes Drury - Ecuador to Bolivia and eastward to southeastern Brazil
dioxippus Hewitson - central Colombia
lacondones Bates - Guatemala to Bolivia
calliste Bates - Mexico to Costa Rica
leucaspis Godart - Colombia to Bolivia.

V. DOLICAON Group

Seven species are credited to this group. Two of them, serville and columbus, are so close that I doubt strongly their independence. Butler's species orabilis may also belong with these. The species composing this group are much more common in collections than are those of the preceding group, although, curiously, I have found them no more abundant in the field. The males of Group V have the woolly scent patch much like that found among the ARISTOLOCHIA Papilios.

The species of the group have the following ranges:

serville Godart - northern Venezuela, eastern Colombia to eastern Bolivia
columbus Kollar - central and western Colombia and western Ecuador
orabilis Butler - Guatemala to western Colombia
salvini Bates - Mexico, Guatemala, British Honduras
callias Rothschild and Jordan - Amazon valley and eastern Ecuador and Peru
dolicaon Cramer - Amazon Basin and southeastern Brazil
iphitas Hübner - southeastern Brazil.

REFERENCES

Hemming, Francis, 1934. The Generic Names of the Holarctic Butterflies, vol.1 - 1758-1863. 184 pp. British Museum (Nat. Hist.), London.

Jordan, Karl, 1924. "Papilio" in Seitz' Macrolepidoptera of the World, vol.5: pp.12-51, pls.1-17.

Rothschild, Walter, and Karl Jordan, 1906. "A Revision of the American Papilios." Novitates Zoologicae, vol.13: pp.411-752, pls.4-9.


Lepidopterists interested in spending the summer of 1952 in the Alaskan Arctic working on Lepidoptera and other insects, under the sponsorship of Yale University and with all expenses paid, should get in touch with the editor of the Lepidopterists' News during the next few months.

SOME NOTES ON TROPICAL BUTTERFLIES

The following notes are excerpts from a letter written by William Clark-Macintyre now living at Cojimies on the west coast of Ecuador. Some years ago I had the pleasure of spending almost a year in the field on the Amazon slopes of Ecuador with "Mac". His letter is in reply to a casual inquiry about collecting on the other side of the Andes.

"Please do not judge W. Ecuador from the material that I've been getting from the sandy, narrow peninsula of Cojimies where everything that isn't sand is salt marsh or mangrove swamp. There's really good stuff over on the other shore where the land is higher - where there abound fresh-water streams and the flora is different. Here, on the peninsula, I've never seen anything even distantly related to the Catagrammas; nor Eunicas; never a Megalura nor Anaea; a few - very few - Adelphas which are all A. cytheris L. or one of its subspecies; only three species of Papilio; Ageronia iphthime Bates and amphinome L.; a very few Morpho and Prepona which I haven't as yet attempted to identify; a few Lycaenids and an abundance of fairly diverse Hesperiids, and that's about all.

"In September I took a rather battered Siderone that seems nearest to S. nemesis Ill. but does not check up with any figure in Seitz. My wife saw another one near the edge of the mangrove swamp. I don't believe that they are indigenous but are stragglers carried by the wind from across the bay. The Danaids are poorly represented here. The Pierids are Phoebis eubule L. and argante F. and the Gonepteryx I thought was menippe Hbn. but you say is maerula F. There are also a few 'Pieris' and Appias but not much more. Satyrids are poorly represented -- only a couple of species of Euptychia. A few Heliconiids and Colaenis julia F. This morning I took a Dione vanillae L. Anything else that I have sent you labelled Cojimies, sea level, is rare.

"If the mass flight of Urania again takes place this spring as I observed it in the springs of 1948 and 1949 I'm going to observe carefully and compose a note about it for the Lep. News. They come from someplace up the peninsula and seem to head straight out to sea by the thousands - millions I might say. Strange to say there seems to be a rather weak and smaller return flight about one month later."

F. Martin Brown
Colorado Springs, Colo.

ENTOMOLOGICAL SOCIETY OF CANADA

A new national society called the Entomological Society of Canada was formed at the annual meeting of the Entomological Society of Ontario at Guelph on November 1-3, 1950. The new society will serve as a link between the various regional societies: the Acadian Entomological Society; the Entomological Society of Ontario; the Entomological Society of Manitoba; the Entomolcgical Society of British Columbia; and the projected Entomological Society of Quebec. The first President is W.A. Ross of the Division of Entomology in Ottawa, and the Secretary is R.H. Wigmore, a member of the Lepidopterists' Society.

CURSO DE ENTOMOLOGICA FROM ARGENTINA

The Museo Argentino de Ciencias Naturales in Buenos Aires, under the direction of Prof. Dr. Agustín E. Riggi, is issuing a series of publications entitled "Curso de Entomologia". The series is being prepared by the Sociedad Entomologica Argentina for publication by the Museum. It is intended as a careful treatment of entomology in the Spanish language and with emphasis on the Latin American fauna. General works of the text type in the Spanish language were notably lacking.

The first part, "Introduccion e Historia de la Entomologia" (pp.1-52; 1947), is by Carlos A. Lizer y Trelles. It is a biographical history rather than an analysis of development of the science. The first section is a cursory and perhaps undiscriminating summary of world entomological history, beginning of course with Aristotle. Of exceptional interest and value is the last half, devoted to a series of brief notes on the contributions of the entomologists of South America. Included are 10 from Brasil, 12 from Chile, 2 from Cuba, 1 from Paraguay, 1 from Uruguay, and 23 from Argentina.

Part II, "Morfologia Externa" (pp.53-101; 1948), also by Señor Lizer, is an adequate summary of general insect morphology, based on standard and classic works by Snodgrass, Imms, Tillyard, Comstock,etc.

Part III has not yet been received for review.

Part IV, "Fundamentos de Fisiologia" (pp.163-210; 1949), is by Pablo Köhler. Necessarily limited by space,this general account of insect physiology is surprisingly comprehensive.

Part V, "Metamorfosis" (pp.211-256; 1949), is by Señor Lizer. It is a rather detailed discussion of this outstandingly interesting aspect of entomology and is well illustrated.

Further parts are expected to appear at a steady rate, with several Argentinian specialists responsible for various subjects in which they specialize.

These parts are handsomely printed on fine paper and have numberous first-quality figures taken from a wide range of reference sources.

C.L. Remington

The American Museum of Natural History, New York 24, N.Y., has recently published a series of "Direction Leaflets", prepared by Miss Alice Gray of the Department of Insects and Spiders. Detailed, clearly written, and well illustrated, they will be of value to collectors anywhere. Apparently the Museum distributes them to anyone requesting them. We have seen the following:

No.1: "How to Make and Use Safe Insect-Killing Jars."
No.2: "How to Make and Use Insect Nets."
No.3: "How to Collect Insects and Spiders for Scientific Study."
No.4: "How to Mount and Label Hard-bodied Insects."
No.5: "How to Make and Use Spreading Boards for Insects."
No.6: "How to Preserve a Collection of Soft-bodied Insects and Spiders."

C.L.R.

THE NOMENCLATURE CONTROVERSY - A REPLY

Readers of the Lep. News are familiar with a debate which has been carried on feelingly in and out of print over events at the meeting of the International Commission on Zoological Nomenclature in Paris in 1948. The most extensive published statements have appeared in Science. The first was by a group of taxonomists in Washington, protesting procedures and actions at the Paris meeting. The second was a collection of letters, all defending some aspects of the Paris proceedings. A third statement has appeared in Science (vol.112: pp.27-30; 1950), this a reply by the Washington group to the letters by Mr. Hemming, et al.

The Washington Group states in explanation of this reply: "It is also our duty, particularly as we are charged with misstatements of fact, to reexamine our position carefully in the light of the comments, to admit any errors, and to reaffirm our beliefs if we are still convinced they are sound." The Group points out that the attempt to be generalized and brief allowed some misunderstandings, and the questioned points are explained in some detail in the new article. The Group deals only with defending its paragraph summarizing the Paris meeting.

Most of the reply is devoted to a carefully documented refutation of each charge against the Washington Group. The matters most extensively reaffirmed are: 1) that there were at Paris "numerous amendments involving almost every article" and that there were "basic alterations in fundamental principles of the code"; 2) that no amendment had been voted on before the Paris Congress by the International Commission, although such is required by the by-laws; 3) that the actual wording of the new text is "entrusted to jurists"; 4) that the amendments should have been, but were not, given "preliminary consideration by the commission for at least one year" prior to final adoption by a congress and that some advance notice to taxonomists in general should have preceded the 1948 Congress; 5) that the Group does "not oppose reform per se" but does oppose "the failure to utilize the normal procedures of consideration by the regular commission, and the haste with which decisions were made at Paris."

The general views of the Washington Group appear to be epitomized by the following quotations: "Having now compared our summary of the facts with the comments, and believing that in no essential particular were we shown to be in error, we reaffirm the position taken in our previous statement. ... it should be reemphasized that in our statement we were not primarily concerned with what was done, but how. ... It is quite true -- and it may be made clear at this time -- that we dislike some actions that were taken at Paris. Some we regard as catastrophic. On the other hand, some we approve. ... [But] had all these matters... been considered in line with the established and customary procedures of the International Commission, we should have felt ... morally obliged to follow the decisions even though in many cases they were not to our liking. ... In the long view, no problem in zoological nomenclature is ever so urgent that confidence in the commission need be sacrificed solely to produce an immediate decision."

C.L. Remington

PERSONALIA

It is with deepest regret that we report the death of Dr. WALTER R. SWEADNER, Curator of the Division of Entomology of the Carnegie Museum in Pittsburgh, Pennsylvania, on 13 January 1951. Dr. Sweadner was only 47 years old. His passing is a very great loss to lepidopterology. A biographical article on Dr. Sweadner will appear in an early issue of the Lep. News.

Dr. LANCELOT A. GOZMÁNY has been appointed Keeper of Microlepidoptera in the Hungarian Natural History Museum in Budapest and is concentrating at present on the Tortricoidea.

Major S.S. NICOLAY, now of Orange, California, has for some time been in Korea with the United Nations forces.

The Society has been most unfortunate in losing one of its ablest field observers, HAROLD I. O'BYRNE, of St. Louis and New Iberia, Missouri. Mr.O'Byrne's untimely passing was in January, 1951. A biographical article is being prepared by Dr. E.P. Meiners.

Another serious loss has been sustained in the unexpected passing, near Pullman, Washington, of Mrs. GRACE H. SPERRY. She and her husband, John L. Sperry, have for many years been a husband and wife team the like of which is seldom seen. Specializing in Geometridae, they have investigated the Lepidoptera of many previously unstudied areas of the Southwest. Recently they were developing a new home in some fine country near Pullman.

DONALD J. LENNOX has arranged his business affairs so that he spends his winters in southern Florida and his summers in his home country, the White Mountains of New Hampshire. Long a skillful rearer of Lepidoptera, he is now working this winter on the early stages of subtropical species.

Prof. KENNETH J. HAYWARD, of the Universidad Nacional de Tucumán, Argentina, was awarded the degree of Doctor Honoris Causa in Biological Science by his University in December. Lepidopterists' Society members will recall that shortly thereafter he was elected a Vice President of the Society. Dr. Hayward has recently completed a small textbook of agricultural entomology in Spanish. The second volume (Hesperiidae - II) of his monumental work on the Rhopalocera of Argentina was published at the end of December but has not yet been received outside of Argentina.

Dr. A. DIAKONOFF, noted specialist on Microlepidoptera and the East Indian fauna, has left the Museum Zoologicum Bogoriense in Bogor, Java (long famous as the Zoölogisch Museum of Buitenzorg), to take up residence in Europe. Dr. Diakonoff was a prisoner of the Japanese occupation forces during the last war but succeeded in making notable field observations of Lepidoptera biology in spite of extremely unfavorable circumstances.

LELAND OSSIAN HOWARD died 1 May 1950 at his home in Bronxville, New York, at the age of nearly 93 years. One of the world's most distinguished entomologists, he reached the peak of his influence as Chief of the U.S. Bureau of Entomology and Plant Quarantine. He headed the Bureau from 1894 to 1927, during almost the entire period of its great development. His honors and high offices are too numerous for listing in this short notice, and interested readers are referred to the many extensive biographies appearing in a number of entomological periodicals. He was the author of over 900 books and papers, and several of these were on Lepidoptera. His work was primarily on problems of economic entomology, but unlike many of his colleagues, he did outstanding work in the field of pure science, notably with the taxonomy of parasitic Hymenoptera.

RESEARCH NOTICES

Dr. J. McDunnough, Nova Scotia Museum of Science, Halifax, Canada, is specializing at present on the geometrid genus Hydriomena with a view to future revisionary publication. He would be glad to purchase or exchange series of specimens of this genus, especially from the Pacific Coast of North America and the southwestern States. He will also make determinations if permitted to retain duplicates.

Living chrysalids of Papilio glaucus (the Tiger Swallowtail) from the Southeastern States urgently needed for genetical studies. I will be glad to purchase any number of these pupae or offer in exchange pupae of many species of Connecticut Lepidoptera or papered adults from Colorado. Write to: Dr. C.L. Remington, Osborn Zoological Lab., Yale University, New Haven 11, Conn.

Recently I have been doing a paper on Skinner's types and have run into a problem. The only ♀ that was in the type series of Papilio arcticus Skinner (= canadensis R.&J.) is missing from the collection. Holland figured a "female paratype" of arcticus in his Butterfly Book (Rev.Ed.,Pl.LXX: fig.3). [Dr. Sweadner informed me that the specimen was not from the type series.] If the ♀ can be located, the Academy of Natural Sciences of Philadelphia will gladly give a ♂ paratype of arcticus in exchange for it. Write to: Paul R. Ehrlich, Dept. of Insects, Academy of Nat'l Sciences, 19th and The Parkway, Philadelphia 19, Pa.

Herr Josef Richter, Christian Dopplerstrasse 12, Salzburg, Austria, is trying to obtain a few healthy pupae of Pachysphinx modesta and its western race, occidentalis. He will gladly give in exchange fine specimens of Parnassius apollo and mnemosyne and other Austrian species.

by William H. Evans
Sun Valley, California

The key to success in bringing butterfly larvae through hibernation or aestivation lies in the proper control of moisture. I keep my hibernating caterpillars in cottage-cheese boxes, or in other small cylindrical cardboard containers, which I cover with pieces of nylon stockings, then place on a shelf in my rearing house. Even in this dry climate there is enough moisture in the air at night to keep most of the larvae alive through the summer and fall. However, I usually sprinkle a few drops of water on them with a medicine dropper every three or four weeks.

I shall describe the procedure used in caring for each species which I have reared.

Minois silvestris Edw.: (Eggs laid by female from La Tuna Canyon, elevation 1200 feet, Los Angeles County, California.) Immediately after hatching and consuming their egg shells, the larvae settled down on the small stems of dried grass on which the eggs had been laid, and remained dormant until fall. When the first rain came, November 9 and 10, 1949, some of the caterpillars moved slightly, then went back to dormancy. Every time it rained during the winter, they behaved this way. In early March, when the days were fairly warm, I gave the larvae a thorough watering. Within half an hour some began to crawl around and nibble the tender blades of fresh grass to which I had transferred them. A few required three or four moistenings to arouse them. Half the larvae died during hibernation.

Coenonympha california Westw. and Hew.: (Eggs laid by female from La Tuna Canyon.) Although given the same treatment as the preceding species, less than one-third of these larvae survived hibernation. Apparently my failure to control the moisture properly in this unusually dry year accounts for such a small percentage of survivals.

Speyeria callippe comstocki Gund.: (Eggs laid by female collected in San Gabriel Mountains, Los Angeles County, California, elevation 6,000 feet.) Within 24 hours after eating their egg shells, the larvae came to rest on the under sides and curled edges of dried violet leaves, and remained inactive from July until the following March, when, with a small camel's-hair brush, I removed them from their resting places, laid them on a small piece of paper towel, and drenched them with several drops of rain water. They either drank or absorbed water until they swelled up to almost twice their former size, and then walked off the damp paper in search of hiding places. I transferred them to tender leaves of cultivated perennial violets. By the next day, they had crawled to the under sides of the leaves and returned to their dormant state. Again using the brush I returned the larvae to the paper towel, and watered them well every day for over a week. After this, they started to feed. A few days later, when furnished with blossoms and new leaves of cultivated Violas, they began to eat ravenously and required no more special attention. Of the 180 caterpillars, 115 lived through hibernation.

Speyeria coronis semiramis Edw.: (Female collected June 22, 1950, elevation 6,000 ft., San Gabriel Mountains, laid 245 eggs between June 30 and July 6.) From July 11 to 21, 240 eggs hatched, and the larvae aestivated within a day or two. By the end of August over half the larvae had died, but the others were alive though dormant. On September 3, a very hot day with thunder showers, many caterpillars began to crawl around rapidly, and after being watered, took a few bites from the fresh violet leaves. However, they did not thrive until I bought some Viola plants and gave them blossoms and tender leaves. The remaining larvae did not come out of hibernation until I moistened them during late September.

Melitaea gabbii Behr and M. wrightii Edw.: These larvae went into diapause in the third instar and remained inactive from June 1949 until March 1950, when I drenched them with rain-water and placed the rearing container in the sun. They walked around awhile, then settled down on the under side of a dry piece of paper towel. Each day they were watered and sunned, but they were preparing to molt and did not crawl off the paper. After completing the molt, they hid in the shade of the fresh leaves of the food-plants. With a camel's-hair brush I moved them to the sunny sides of the leaves. After being exposed to sunshine for half an hour, they began to feed. The larvae which received an hour or two of sunshine every clear day fed readily; those kept in the shade had to be disturbed several times a day to keep them active. In a few weeks all the caterpillars made the fourth molt. In the fifth instar the larvae which did not get enough sunshine went back into hibernation, and are still dormant at this time (November 22). Recently I sprinkled them, causing them to walk around; therefore I assume they will soon arouse. All larvae which were given sufficient sunshine last spring completed the fifth molt and fed through to maturity.

MAKING VENATION VISIBLE

The lepidopterist who desires a simple and effective way to render the venation of his specimens temporarily visible while running them through a key may find an ordinary hypodermic needle of use. Fill the instrument with carbon tetrachloride, chloroform, or whatever volatile liquid you prefer to use, and a small drop can easily be placed on the wing exactly where wanted, with the added advantage that the needle is immediately handy to arrange any disturbed part.

Edward G. Voss
Ann Arbor, Michigan

I cover my spreading boards with ordinary cross-section paper (10 blocks per inch). A soft resinous adhesive is preferred, to facilitate pinning through the paper. This takes the guesswork out of mounting.

Anonymous

FIELD NOTES ON DIURNAL MOTHS OF THE GENUS ANNAPHILA

by Frank P. Sala
Los Angeles, California

The genus Annaphila Grote includes a group of tiny, highly colored, diurnal noctuid moths. According to the check list of Dr. J. McDunnough, published in 1938, the genus is placed immediately ahead of the Heliothiinae in the subfamily Amphipyrinae.

Very little is known about this genus, and most of the taxonomic work was done long ago, with most of the types either lost or nearly worthless. Two years ago, the late Claude I. Smith undertook to work out a monograph on the genus, but an unfortunate accident halted this work before it was completed.* This summary has as its purpose the accounting of some of the general traits of the genus.

As was stated, very little is known about the genus, but for the past ten years, four of us -- Christopher Henne, William H. Evans, C.I. Smith, and the writer -- have made the study of this group one of our special interests. The four of us, I believe it is safe to state, have taken the majority of the specimens in collections.

First of all, let us consider how one becomes familiar with the elusive Annaphila. They are among the earliest of the spring fliers for any given locality. In southern California, A. arvalis H.Edw. is on the wing in the middle of February, the exact time varying with the break in the cold weather that announces the arrival of spring. An unmistakable sign of the impending flight is the first blooms of the local Salix (Willow). This tree is a powerful attractant of Annaphila, as well as many other spring insects. For any given spot, the time of flight will vary with the break in the cold, wet weather that comes in spring and will run through to the middle of July for the high altitudes (10,000 ft. or more). They have been missed because of the early flight and the short duration of it.

Even if one is at the right place at the right time, he must learn to see an Annaphila. The average wingspan of the various species is less than one-half inch (10 to 16 mm.). For me, these little moths are the last word in net collecting. They are tiny, but very beautiful and elaborate in design. Their flight is rapid and erratic, and even when one is familiar with an Annaphila, he must be cautious and accurate to be successful. To have any amount of luck at all, one must find the plant that is attracting or he will walk miles for naught. At the plant (and many plants will draw when in full bloom), one may see the little moths stop and feed, and note the nervous spasmodic raising of wings that identifies the genus.

The spot where one may collect this group may look bleak, barren, and totally devoid of active insect life. Often the moth will apparently precede its foodplant in appearance. It is necessary to be there on the first warm day to take fresh specimens. An interesting fact also is that one year there will be a heavy flight, and for the next several years there are no apparent specimens to be seen. This leads one to believe that some years the moths will remain dormant as eggs or pupae over an entire year, as do many insect species in this area.

The type of country where these moths may be expected is usually irregular in contour. As Mr. Henne stated it, "Near the head of a canyon and usually on the protected side". This may be due to the type of food-plant that the genus prefers. All of the species that have been reared, either in part or completely, have been on small annuals with brightly-colored blossoms. The larva is, in all cases thus far noted, a blossom and seed feeder. These plants live in the protection of a larger plant, and it is here one may find larvae.

The larvae are of a rather ordinary-looking noctuid type, in general, and in the early instars are green and translucent, resembling Autographa larvae. The final instar usually shows a change in the color of the larvae, either to brown or gray. There is usually at least one white or cream lateral stripe, with some species being multi-striped.

Pupation occurs at the surface, with possibly a small crevice serving as an anchor for the thin earthen cell. I have reared only one species, this near to A.astrologa B.&McD., but the others I have seen are similar in habit.

We have found species of Annaphila in many areas of southern California and specimens are recorded from northern California and Oregon in the north and through Arizona in the south and Colorado in the east. It is safe to assume that all the intervening territory is fertile Annaphila country, at the right season.

McDunnough lists 15 species, and our research so far seems to indicate that we may have three or four more. As the material available becomes plentiful, it is my belief that this number will be close to forty; each new area so far shows its own separate species.

A new Japanese entomological periodical has been brought to our attention by Mr. T. Shirôzu, a newly elected member of the Lepidopterists' Society Executive Committee. This is the Transactions of the Shikoku Entomological Society, of which Vol.1, pars 1, dated "January 1950", was issued April 4, 1950. Pars 2 is dated "March, 1950". Each pars has one large paper, on Buprestid beetles in the first issue, on immature bugs (Hemiptera) in the second. The sponsorship and subscription price are not given in any western language.

C.L.R.

*[Dr. F.H. Rindge is now completing a revision of this genus, based on Mr. Smith's notes and specimens. - Ed.]

HETEROPTERUS MORPHEUS (Hesperiidae) A DEFINITE DUTCH SPECIES AGAIN.- It does not often happen that a butterfly completely escapes the attention of the eager collectors in an over-peopled country like the Netherlands. Yet, as far as I can see, this must have happened to Heteropterus morpheus (Pall.), a little brown Hesperiid. In the 19th Century the species was caught in various localities in the province of Guelderland, in the neighborhood of Zutphen. After 1860 no collector is known to have captured a specimen. It was considered an extinct butterfly.

In Belgium it occurred very locally at a place near the Dutch border, but few collectors paid any attention to this area. Then suddenly, in April, 1950, the Entomologische Berichten announced the capture of morpheus in July, 1949, near the Belgian frontier ("Heteropterus morpheus Pall. opnieuw in Nederland gevonden", by W. Verhaak, Ent. Ber.,vol.13).

On July 13, 1950, I happened to be collecting Coenonympha tullia Müller in a moorland near Zutphen. When returning from this trip I found in an adjoining meadow a small brown butterfly hurrying away over the grass. When I saw its pale underside with oval brown rings, I realized I had found the habitat of H. morpheus; it was exactly the same place where it occurred a hundred years ago. Soon I saw other specimens flying above the marshy meadow.

With a collector who turned out to have had the same experience, I discussed the case. We agreed that the only theory which would account for a recapture at the same spot after one century is that the butterfly has indeed escaped attention. No collector ever pays attention to these inconspicuous meadows adjoining some interesting moorland. The period during which the butterfly is to be found is very short: within a few weeks after the first appearance all specimens are gone. We must also consider the possibility that morpheus had a particularly good season, like many other species in this country. That would have enlarged our chance of meeting it. The place is isolated from the border habitat, the distance being 75 miles, and I do not believe that morpheus has re-established itself in this very locality.

Kees Lems
Leidschendam, Netherlands

ADDITIONS TO "A LIST SUPPLEMENTING BATES' 'BUTTERFLIES OF CUBA' "*

by S.L. de la Torre y Callejas
Matanzas, Cuba

29. Echelatus sempiternus dilloni Bell & Comstock
One female collected in Santiago de Cuba.
30. Calisto herophile parsonsi Clench
New subspecies described by Harry K. Clench from Buenos Aires, Western Trinidad Mts., prov. Las Villas, 3000 ft. (June 19-21, 1939).
31. Nathalis iole alayoi S.L. Torre
New form described by the writer from Bellamar Beach, prov. Matanzas. (December, 1949).

*See Lep. News, vol.3: p.65; 1949.

MIGRATION IN THE ATLAS MTS. OF MOROCCO.- À propos of the pierid migration in Japan mentioned by Mr. Taro Iwase in the Lepidopterists' News (Vol.4: p.43; 1950), in which he suspects the species to be Pieris daplidice (L.), I would like to mention a migration I noticed this spring at 13,000 ft. in the m'Goun Range of the High Atlas Mountains of Morocco. I was crossing the Range as an alpinist, on skis, on April 21st, and at 13,000 ft., P. daplidice was passing over from the Sahara, from south to north, at the rate of roughly one specimen every 20 seconds. I picked up a fine series of 20 ♂♂ and ♀♀ on the snow, where they were falling, apparently exhausted, in about fifteen minutes. With them were a very few Anthocaris belia (Cram.), and one solitary female, dead in the snow at 12,000 ft., of Anthocaris charlonia (Donz.). At the same time Vanessa cardui (L.) was passing from south to north at the rate of one every 10 seconds. Two days later, on the southern (Sahara) side of the divide, at about 6,000 ft., the sphingid Deilephila livornica (Esp.) was flying in hundreds on flowers of Ragwort (Senecio sp.) also moving south to north. In all these species I assume the primary migratory impulse to be due to lack, or depreciation, of the respective foodplants in the desert areas of the Sahara south of the High Atlas Mts. At a considerably later date, the desert pierid, Teracolus nouna Luc., was noticed at 6,000 ft. in the Middle Atlas Mts., moving from south to north.

Colin W. Wyatt
Farnham, England

A NEW WAY TO COLLECT SPEYERIA DIANA.- Arriving on the 3rd of July in North Carolina at my favorite Speyeria diana hunting ground, I noticed at once that I had come too late for easy capture of the bulk. They no longer would settle on dirt roads; on their wings they flitted through the woods. When practically on top of the ridge I noticed a footpath going up to a little higher altitude of about 300 feet. This I took with some expectation. On each side is impenetrable wood and on the right side of the path is a rain groove of about a foot wide. Following this path up to about 100 feet just coming around the bend I saw a male diana coming towards me hugging the gully closely. For the first time using a GREEN net, an idea struck me, and hoping that it would work I dipped the open net in the gully and what I suspected came to reality. The diana flew right in. Others came down that groove the same way; I just stood still with the net in the gully and like the first one they flew right in. In this manner I collected 22 males, the biggest haul I ever made within 3 hours, but I did not get any females this way.

Theodore Bock
Cincinnati, Ohio

Field lepidopterists who are interested in spending a little time during the season collecting for sale mass lots of specimens of larvae, pupae, and adults of Monarch and Cabbage Butterflies and adults of the Cecropia Moth should get in touch now with: Mr. V.A. Van Eyck, United Scientific Co., Inc., 200 N. Jefferson St., Chicago 6, Illinois.

FIRST PRELIMINARY DISTRIBUTION REPORTS ISSUED

Toward the middle of October the collaborators for THE NEARCTIC BUTTERFLIES received their first dividend for collaboration. Two 11-page reports were sent to each collaborator who contributed data on ENODIA and NEONYMPHA. These reports detail all specimens reported and are accompanied by distribution maps for each species. Collaborators to the project who did not send data on the two genera reported may receive both for 25¢; other Society members can purchase them for 25¢ each.

Preliminary reports 3 and 4 on MEGISTO and PARAMECERA were ready for distribution about the first of December and were mailed after the Christmas postal rush. They are available to non-collaborators for 30¢ and 5¢, respectively.

The last set of Data Sheets for the Satyridae will be mailed to collaborators early in 1951. During the spring of 1951 members who are not now enrolled as collaborators will have the opportunity of joining in for the distributional studies of the Nymphalidae. It is estimated that this will take about two years to complete.

F. Martin Brown
Coordinating Editor
THE NEARCTIC BUTTERFLIES

[Ed. Note: - These fine "preliminary" reports are important documents indeed - the first detailed records of geographical distribution for the Satyridae of North America. C.L.R.]

TWO LEPIDOPTERA COLLECTIONS FOR SALE

Theodore Bock, 70 Ehrman Ave., Cincinnati 20, Ohio, wishes to sell a collection of 3000 mounted butterflies, moths, and beetles housed in 7 Ward's Display Cabinets (consisting of 28 drawers), 10 extra Cornell type glass-topped drawers, and 31 Schmidt boxes. About 1/2 of the specimens are Lepidoptera (1000 tropical "Ornithoptera", Papilio, Morpho, etc. - 350 N.Am. Rhopalocera, 100 N.Am. moths, 100 European, 50 diff. N.Am. Catocala-sappho, etc.) and one-half Coleoptera (1000 tropical - Buprestids, Cerambycids, etc.- , 150 N.Am. Buprestids). Also for sale is literature, including Staudinger and Schatz' 3 volume work and Vols. 3, 10, 14 of Seitz' Macrolepidoptera of the World.

Kurt Hobert, Rivera Placenda, Greene, N.Y., wishes to sell a fairly complete mounted collection in fine condition of North American Rhopalocera, Sphingidae, and Catocala, with large numbers of exotic Lepidoptera. Many of the N.Am. specimens were reared. The collection is in one two-row cabinet with 32 glass-topped drawers, one one-row cabinet with 30 solid-topped stock boxes. He also has many specimens in envelopes. Mr. Hobert has no time to pack the voluminous material for shipment and hopes to arrange the sale to a purchaser near Greene who can pick up the cabinets personally.

C.L.R.

REMARKS ON KILLING METHODS

Winter is the time of year when we get a fair chance to read up on accumulated literature, and that is the excuse I offer for sending at this late date my comments on F.M. Brown's "Field techniques for butterfly collecting", [Lep. News, vol.4: p.10].

The main point of interest, for me, in this article is the author's killing method. Now I have surreptitiously pinched a butterfly now and then, when it was a prize catch that simply would not lie still and be introduced to the killing jar. But I always thought collectors did this sort of thing on the sly, a little ashamed of such crude methods. I was surprised, and also pleased, to see so noted a collector as Mr. Brown come right out in the open and admit that he pinches his butterflies. Still, I have not started to pinch my captures. The reason is plain -- I retain only very few of the butterflies I collect. Before I can adopt any method of killing, I must be sure that it is acceptable to those who get the specimens from me. I would be very grateful to any readers of Lep. News who care to send in their views on pinching.

I notice that Mr. Brown complains of stiff specimens resulting from the use of a killing jar. I also note that he uses carbon tetrachloride. I have used this killing agent for beetles and find it kills far too quickly, and often results in excessively rigid specimens. Though little attention is given to the setting or spreading of Coleoptera I have found that even for these, "Carbona" is hardly satisfactory. I now use it only for killing beetles of little value.

Cyanide is the only thing for Lepidoptera. There are a few tricks connected with this latter poison, which have come to my notice, and which may be worth mention here. Cyanide jars have a nasty habit of quite suddenly and unexplainably ceasing to function. For this reason I keep several going at once and before starting a trip, test some of the jars I intend to take, with a house fly or some other victim that comes handy. Cotton or any padding used in cyanide jars absorbs all the gas, and the jar will not kill for some time afterwards, often as long as twelve hours. Thereafter, most of the killing power may be concentrated in the padding. Don't change padding just before starting on a collecting trip.

Insects will always flop around for awhile in a cyanide jar; the danger of their suffering damage from this is usually exaggerated. Specimens that turn inside out, if they are worth the trouble, can be rescued by placing them in a relaxing jar, with very little moisture, for 24 to 48 hours. They will then turn back easily.

The smaller the jars, the more one can carry conveniently, and the less danger of insects damaging themselves. I use plastic shell vials 1 x 3 1/2 inches for anything with wing-spread less than Pieris rapae. This includes the great bulk of moth species.

Richard Guppy
Wellington, B.C.

by Johannes Reichel
Wetzlar, Germany

The calendar showed the 23rd of May 1938 when a cog-wheel train took me uphill through a narrow ravine on the bottom of which a small river roared. Kalavryta, a small town situated at the foot of the Chelmos Mountain, a former volcano, was the primary aim of my trip. The purpose of it was to hunt Parnassius mnemosyne athene and other rare species. During the next days I roamed the entire vicinity of Kalavryta, always hoping to locate the beautiful athene. I sighted a few Papilio alexanor Esp., the South European swallowtail, and a late female of Zerynthia polyxena (Schiff.) was still flying about, completely worn. Although my hopes to get P. mnemosyne were disappointed during the next 16 days,the area hemming the foot of Chelmos at 2000-3000 ft. altitude proved to be good hunting grounds. Among my catch were 7 specimens of the rare Pieris krueperi Stgr., most of them in fresh condition. Most of the Polyommatus semiargus var. staudingeri (Chr.), the Peloponnesian subspecies of P. semiargus (Rott.), were worn and battered around Kalavryta. However, 1000 feet higher, in areas of 3500' and more altitude, this pretty butterfly with the large orange spots on the underwings was just in its prime, and several freshly emerged specimens rewarded me for climbing up and down the steep hills.

On 9 June I was about to give up my hopes for P. mnemosyne. It became high time now to start hunting in the Parnassos Mountains where Colias aurorina var. heldreichi Stgr., another species which I was most eager to obtain, was supposed to wing about. A last attempt to locate P. mnemosyne brought me up to a large plain at the foot of the inner cone of the former crater. It bordered on large forests through which I had ascended. These forests mainly consisted of firs, mixed with oaks, and other broad-leaved trees. I just had emerged from the forest when I saw white-and-black butterflies flying around in fair abundance: - Parnassius mnemosyne var. athene! Finally, I had located them! All of the specimens were in fresh condition, and they were easy to catch.

After two or three hours, when dark was approaching, I turned back towards Kalavryta. A large Colias in the grasses suddenly caught my eye, just before I was going to reënter the forests. It could not have emerged from the pupa more than three or four hours ago. When it spread its wings in the killing jar I found my supposition confirmed: Colias var. heldreichi! Now the Parnassos Mountains did not attract me any longer, since both species which I was most eager to get, I found on that big plain on the Chelmos.

On the next day I abandoned my room at Kalavryta and moved up to the Chelmos in order not to lose five or six hours each day for the ascent and descent. The open sky became my roof and the plain ground my floor. However, what did that matter to me under such circumstances? A thick comforter protected me from the cold. Although it was mid-June the thermometer sometimes dropped below zero (Celsius) at night, turning the snow water into ice. The altitude of this area was about 5500-6000 feet.

During the next days both species, P. mnemosyne and C. heldreichi, became more and more abundant. In respect to mnemosyne I had not expected differently, but Colias var. heldreichi was known as one of the rarest species, which no former collector had met with in large numbers. This year must have been an exceptional occasion - a year of weather conditions which exceptionally supported the development of this species. One day, I netted 37 males within a single hour on a small slope. On or about 19 June (since I have lost all my field-notes during the war when my house burned down I cannot give the exact date), I viewed and caught the first two females of heldreichi. Two days later I netted the first white female, form fontainei, one of the most expensive European butterflies. Most of the males were worn now but all the females were in perfect condition.

P. mnemosyne settled on grasses, flowers, or shrubs on rainy days or after the last sun-ray had been checked by the cone of the Chelmos. They could be taken easily by hands and none of them tried to escape. By the 20th most P. mnemosyne were worn.

The last week on the Chelmos brought me exceptional success. I netted more white females (ab. fontainei) than had ever been caught before. Since they varied considerably - broad or narrow black markings, yellowish, greenish, rosish-white or even light-yellow color of the wings - I took them all. When I left on the 30th I counted 99 ab. fontainei in my boxes. On the 29th I viewed a big bluish butterfly winging up a slope. Fortunately, he settled on a flower, allowing me to approach. It turned out to be a white male of Colias heldreichi, never found before. The bluish color was caused by the blue glimmer which is characteristic for the males of the form heldreichi of Colias aurorina. I took this catch home with me, although it was badly worn, and repaired it as well as possible.

After dark fell, I used to kindle a Petromax-lamp which I placed before the entrance of the cavern which I had discovered after a few days, and where I had set up "headquarters". A steep slope was in front of the cavern, and forests consisting of firs and oaks were approximately 200 yards distant. The catch was very satisfactory. Mainly, Noctuids were attracted by the light, among them about 80 specimens of the rare Plusia beckeri var. italica Stgr., a form which previously had not been caught in Greece except on very few occasions. When I placed the lamp on the open plain, success was lacking completely. Not more than one or two Noctuids were attracted within an hour, although the spot where I had placed the lamp was not far from the cavern.

On the 30th of June I left the Chelmos Mountain since most of the Lepidoptera were battered now. Neither before nor thereafter have I been lucky enough to run into such an eldorado of Lepidoptera.

REMARKS ON F. MARTIN BROWN'S "MEASUREMENTS AND LEPIDOPTERA"

by Vladimir Nabokov
Ithaca, New York

Mr. Brown has devoted most of his article on "Measurements and Lepidoptera" (Lep. News, vol.4: p.51) to criticizing from the point of view of statistics the measurements used in my paper on "The Nearctic Members of the Genus Lycaeides" (Bull. Mus. Comp. Zool., vol.101: 479-541; 1949). I wish to say a few words in reply.

Under the name of sublivens (l.c.: p.513) I described on the basis of nine males a subspecies of argyrognomon (Bergstr.) [= idas auct.] from the St. Miguel Mts., S.W. Colorado, and, for the sake of completeness, listed the measurements of all the specimens (uncus parts and forewing). This was followed (pp.516-520) by a description of another, much more complicated, form from the Teton Mts., argyrognomon longinus. [See supplementary notes at end.]

"Although a table of data is not presented for [longinus]", writes Mr. Brown (who consistently misspells the name of the thing), "measurements on seven specimens are scattered in the text." Of these DELIBERATELY scattered measurements, Mr. Brown gathers into a tidy column the "F" ones (mean length of falx) in order to compare them with my "F" column under sublivens.

Now this is the danger of statistics (and "keys", and those jagged lines that are so amusing to plot). Only three of the seven males belong to typical longinus (p.516) in the qualitative sense in which the nine sublivens males are typical. The other four specimens I discussed (p.519) under longinus are more or less definite transitions to melissa, and I pointed out that the matter is a systematist's nightmare. Nightmares cannot be statistically treated, but they can be very precisely described. If, moreover, Mr. Brown turns to my "Introduction", he will see (pp.480-481) that I took great pains to define in qualitative terms the specific differences between melissa and argyrognomon. These specific formulas and the whole of the distal part of the uncus in ventral view ("FHUE") should be taken into account when comparing the seven specimens of sublivens with the three typical and four "melissoid" specimens of longinus; whereas Mr. Brown jumbles up the all-important qualitative values with quantitative ones and enforces upon me a statistical procedure that I never intended, or intend, to follow.

In explaining his misleading table, Mr. Brown refers to something he calls a "typical population" of sublivens. At the moment of description I had only nine old specimens, all males, preserved in a museum collection. In its habitat, sublivens during the last fifty years may have become extinct, for all I know, or taxonomically blurred by hybridization. Experience tells me that when I study a series of nine specimens that closely resemble each other, differ from allopatric conspecific sets sufficiently to be assigned to a new subspecies, and come from a region where the species has not been detected before, the specimens may be said to belong to a monoform race (l.c.: "Introduction"), probably represented at the station that the series comes from by a certain number of live individuals; but this is as far as I desire to go in this business of "population" -- a term the lax use of which leads to the notion that a population IS a subspecies (or species), whereas, in point of fact, a population only represents a subspecies or BELONGS to it.

"The question then is", Mr. Brown continues, "is the apparent difference [between the F means of sublivens and longinus] real or only a result of a small size of the samples used?" There is no such question here -- for the simple reason that F, alone and unqualified, is not what separates the two forms. To estimate the chances of the two series being "samples drawn from the same general population" as Mr. Brown proposes to do "mathematically", would be a loss of time. The term "general population", if it has any meaning at all, presupposes a more or less continuous stretch of inhabited space; but between the St. Miguel Mts. and the Tetons, the only known habitats of argyrognomon sublivens and argyrognomon longinus respectively, there is a 500 miles gap where nobody has yet found argyrognomon; and, anyway, the problem to be solved is not whether sublivens and longinus overlap in F, but what is the true significance of the alar resemblance between argyrognomon sublivens and melissa pseudosamuelis (l.c.: p.530).

In conclusion I must object to Mr. Brown's casual condemnation of my "time-consuming counts of scale rows" which to him "mean nothing until the statistical parameter of the data on each subspecies is established". I was not concerned with "statistical parameters" when writing my paper. I was concerned with presenting what my scale-line method allowed to present -- an exact description of taxonomic types. I was also concerned with giving examples of its application to the description of phases selected at random within the variational range of a racial wing pattern and of such extremes as complete obliteration of this or that component. I cannot see what part "parameters" could have played here, and how they affect the description of holotypes. Mr. Brown also suggests that future revisers measure a thousand, or more, unci of sublivens -- a nice batch that the miracle of statistics is somehow supposed to produce. I have dissected, drawn and measured many more specimens of Lycaeides than that, and have arrived at the conclusion that the kind of genitalic ranges I have computed illustrate with sufficient clarity racial characters, despite small samples of each race; and that structural (uncal) fluctuation in connection with intra-racial wing-size variability is (if obviously stunted individuals are omitted) a negligible factor. And, finally, I have been concerned with "qualitative" subspecies (since I consider that merely "quantitative" phenomena have no taxonomic status) and with trying to restore the qualitative approach to its position of honor, while placing at its service quantitative values to guide the next man armed with a microscope, a camera lu-

cida, and a finely nibbed pen. After all, natural science is responsible to philosophy -- not to statistics.

POSTSCRIPT

In July and August, 1949, I searched diligently but in vain, at the sagebrush level in Jackson Hole, for colonies or wandering individuals of the bright-colored, alfalfa-and-Hedysarum-feeding melissa form that is common in Utah at 6000 ft. alt. [see my discussion of its intergrades with the alpine melissa annetta (Edw.) in the Wasatch Mts., l.c.: p.535]; but I did find, in some numbers, the "melissoid" form of argyrognomon longinus Nab., which I already knew, on an isolated, well-timbered hill [Blacktail Butte] that rises to about 700 ft. above the floor of the upland valley [6000-7000 ft.alt.] immediately east of Moose, between Jackson and Moran. From July 15 to the end of August I studied typical longinus in the mountains west of Jackson (it was especially abundant in the vicinity of Teton Pass, on slopes between 7500 and 9500 ft. alt. where I ascertained its foodplant) and eastward along the Hoback R., at the foot of Battle Mt., from about 6500 ft. up, flying in company with such butterflies as Speyeria atlantis tetonia dos Pas.& Grey, S. callippe meadii (Edw.), S. egleis macdunnoughi (Gund.), S. hydaspe purpurascens (H.Edw.), S. mormonia clio (Edw.), and S. zerene garretti (Gund.) [one of the males I took has the scintillant macules reduced and conspicuously rimmed with fine black]; Boloria rossicus ingens (B.& McD.) and kriemhild (Stkr.); Euphydryas anicia ssp. and E. gillettii Barnes [a very sluggish insect in comparison to its vivacious palearctic ally maturna (L.)]; Oeneis jutta ssp. and norna ssp. [one almost typical, others transitional to ssp. chryxus (Dbldy.& Hew.)]; "Coenonympha" haydenii Edw.; "Philotes" enoptes (Bdv.); and "Pieris" callidice occidentalis (Reak.). I saw nothing of longinus above timberline in the Grand Tetons [around Amphitheatre Lake] where B. rossicus grandis (B.& McD.), Lycaena phlaeas ssp. [near ssp. fieldeni (McLach.), and very much like snowi (Edw.) on the wing], Colias skinneri Barnes and Pyrgus centaureae freija Warr. were taken. Among other things incidentally picked up I may mention the following from around Jackson at about 6500 ft.: Speyeria cybele letona dos Pas.& Grey, Boloria selene ssp. [between ssp. albequina (Holl.) and ssp. tollandensis (B.& Benj.) and toddi (Holl.) [=? frigga (Thun.)] ssp. [hindwing below suffused with bolorian purple]; a colony of darkish Apodemia mormo F.& F. on a very dry slope above Wilson at 7500 ft. alt.; Strymon saepium (Bdv.), itys (Edw.), and edwardsii (Saund.); Mitoura spinetorum (Hew.) near johnsoni (Skin.); Callipsyche behrii (Edw.); Strymon titus ssp.; "Phaedrotes" piasus (Bdv.); Lycaena thoe ssp. and mariposa (Reak.); and Polites sonora utahensis (Skin.) and peckius (Kby.). The combination selene-toddi-thoe-peckius on a marsh north of Jackson reminded one uncannily of, say, West Wardsboro, Vermont.

My material is now in the Cornell University Museum, Ithaca, New York.

V. Nabokov

IN REPLY TO PROF. NABOKOV

Dr. Remington has allowed me to see Prof. Nabokov's article before publication so I may briefly reply to it at this time. First let me say that the reason I used his paper as an example to make my point was because in every other way it is excellent. I believe I implied that, in the article "Measurements and Lepidoptera".

Taking up his comments point by point: If the subspecies of the American Lycaeides are so evanescent that there is some question that they will survive so short a time as 50 years in so undisturbed an area as the San Miguel (not St. Miguel) Mountains in southwestern Colorado I, for one, question the advisability of naming them.

I accept his criticism of my table pulled together from bits here and there in his paper. I thought that his subspecies was a good one.

We are in complete agreement on the definition of a population. So far as I can see our apparent disagreement is upon my use of the term "general population". I use it to define an aggregate of local populations which in turn are each composed of many more or less geographically united colonies. That Prof. Nabokov's samples of longinus and sublivens came from points about 500 miles apart along an almost continuous chain of high ranges does not of necessity mean that they cannot represent fragments of a single subspecies.

I am surprised by Prof. Nabokov's interpretation of my statement about "1000 measurements". I deliberately capitalized the word STATISTICALLY to point up the folly of depending solely upon measurements to set up subspecies. I am dead set against it. I favor very strongly the use of statistics to help avoid taxonomic errors.

As for scale-line counts, as important as they may become, I still think them a waste of time AS THEY STAND IN PROF. NABOKOV'S PAPER -- without parameters and no evidence of their stability from colony to colony of the SAME SUBSPECIES.

Since Prof. Nabokov "consider[s] that merely 'quantitative' phenomena have no taxonomic status" it is odd that he places so much stress on scale-line counts and measurements, both of which are quantitative. I suspect that he uses much quantitative data in forming his judgments concerning species and subspecies; we all do. My plea is for proper treatment of such information.

Prof. Nabokov concludes: "After all, natural science is responsible to philosophy -- not statistics". Quite right, but to the philosophy of no one person. This philosophy has been painfully built upon the work of many men using all of the tools available. I might say that natural science would not be greatly changed if all of our modern taxonomy and statistics were tossed into the wastebasket. It would be less well organized without taxonomy and less well understood without statistics. Both are tools, not ends in themselves. Unfortunately many taxonomists and statisticians forget this.

F. Martin Brown

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped eventually that our coverage of the world literature will be virtually complete. It is intended that every paper published since 31 December 1946 will be included. In the first three volumes of the Lep. News 886 were listed. Abstracts give all new subspecies and higher categories with generotypes and type localities. Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members, and the many recently received are gratefully acknowledged. Initials of cooperating abstractors are as follows: [P.B.] - P.F. Bellinger; [A.D.] - A. Diakonoff; [C.dP.] - C.F. dos Passos; [L.G.] - L.A. Gozmány; [G.dL.] - G. de Lattin; [C.R.] - C.L. Remington; [T.S.] - T. Shirôzu. A complete set of these pages, for clipping and filing, may be obtained for Vol.4 for $0.50.

395. Abercrombie, R.G., "The Brown Argus (Aricia agestis) in the Peak District." Entomologist, vol.83: p.128. June 1950.

396. Amiot, Ph., "Elevage de Graelsia isabellae Graef" [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.26-27. 1 April 1950.

397. Autrum, Hansjochem, and Wilfriede Schneider, "Vergleichende Untersuchungen über den Erschütterungssinn der Insekten" [In German]. Zeits. vergl. Physiol., vol.31: pp.77-88, 3 figs. 1 July 1948. Sensitivity to vibration is much greater in orders (including Lepidoptera) having the 'subgenual organ' on the tibia than in those lacking it. [P.B.]

398. Baynes, E.S.A., "Irish Argynnis euphrosyne, Linn." Entomologist, vol.83: pp.105-108. May 1950.

399. Beck, S.D., N.M. Bilstad, and J.H. Lilly, "Prepupal Changes in the Ventricular Epithelium of the European Corn Borer, Pyrausta nubilalis (Hubn.)." Ann. Ent. Soc. Amer., vol.43: pp.305-310, 1 pl. Sept. 1950.

400. Bentinck, G.A., "Gevaar van paradichloorbenzol voor collecties" [In Dutch]. Verslag 104 Zomervergadering Nederl. Ent. Ver.: p.xxv. 1 May 1950. Warns against use of paradichlorbenzol ($C_6H_4Cl_2$) in collections. [A.D.]

401. Berg, Clifford O., "Biology of Certain Aquatic Caterpillars (Pyralidae: Nymphula spp.) Which Feed on Potamogeton." Trans. Amer. Micr. Soc., vol.69: pp. 254-266. July 1950. 4 spp. treated. An excellent paper, unfortunately without figures. [P.B.]

402. Bernardi, G., "Une nouvelle sous-espèce de Zegris eupheme Esp. (Lep. Pieridae)" [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.1-2, 2 figs. 1 Jan. 1950. Describes as new Z. e. maricana (Morocco). [P.B.]

403. Bernardi, G., "La variation géographique des Leptidea sinapis français (Lep. Pieridae)" [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.41-44, 1 map. 1 June 1950. Distribution of the two subspecies in France. [P.B.]

404. Bourgogne, Jean, "Expériences d'hybridation dans le genre Fumea (Lep. Psychidae)" [In French]. Bull. Soc. Ent. France, vol.55: pp.68-73. 24 May 1950. In cross F. casta x F. crassiorella males develop more rapidly than in parental species and are fertile; females die as larvae. [P.B.]

405. Bourgogne, J., "Les secretions odorantes chez les Lépidoptères (à propos d'un article récent)" [In French]. Bull. Soc. Ent. Mulhouse, 1949: pp.28-29. 1 April 1949.

406. Bryk, Felix, "Eine kleine Ausbeute von nordindischen Spinnern" [In German]. Ent. Tidskr., vol. 71: pp.55-59. 28 May 1950. Describes as new: Desmeocraera perdicula, Notodonta bhasini (Notodontidae); Eupterote geminata gardneri, E. fabia asemos (Eupterotidae); all from Dehra Dun, India. Notes on some other species. Reared specimens; food plants listed. [P.B.]

407. Bryk, Felix, "Warum muss der Linnésche Name für die schwedische 'Cydippe' fallen?" [In German]. Ent. Tidskr., vol.71: pp.60-62. 28 May 1950. Taxonomic difficulty in Argynnis. [P.B.]

408. Carpenter, G.D. Hale and T.H.E. Jackson, "New butterflies from East Africa and the Ituri Forest." Proc. R. Ent. Soc. Lond. (B), vol.19: pp.97-108, 1 pl. 15 Aug. 1950. Describe as new: Charaxes etheocles suk (Uganda); Pseudathyma lucretioides (Kenya); Euptera mirifica (Belgian Congo); Bematistes quadricolor morogoro (Tanganyika); Acraea chilo magnifica (Kenya); Mimacraea krausei karschioides (Sudan); Colotis fausta somalica (Italian Somaliland). Descriptions of some other little-known species. Also names a number of forms. Patterns described and some figured; structural characters not mentioned. [P.B.]

409. Chauvin, Rémy, Physiologie de l'Insecte [In French]. 619 pp., 83 figs. W. Junk, The Hague. 1949. Considerable material on the Lepidoptera is included. Extensive bibliographies follow each chapter. [P.B.]

410. Cockayne, E.A., "Aberrations of British Macrolepidoptera." Ent. Mo. Mag., vol.84: pp.265-267, 1 pl. Dec. 1948. 16 named, 15 figured (Arctiidae, Geometridae). [P.B.]

411. Cockayne, E.A., "Thera juniperata, L., ssp. orcadensis." Ent. Rec. Journ. Var., vol.62: pp.27-28. Mar. 1950. New ssp. from Orkneys. [P.B.]

412. Cockayne, E.A., "Sarrothripus degenerana Hübner (Lep.: Sarrothripinae): a Species New to Britain." Entomologist, vol.83: pp.123-124, 1 pl. June 1950.

413. Cockayne, E.A., "A note on the nomenclature of Philudoria potatoria L." Ent. Rec. Journ. Var., vol.62: pp.65-66. July-Aug. 1950.

414. Cockayne, E.A., "Apamea furva, Schiff., ssp. britannica, ssp. nov." Ent. Rec. Journ. Var., vol. 62: p.67. July-Aug. 1950.

415. Dannreuther, T., "Migration Records, 1949." Entomologist, vol.83: pp.109-114, 129-133. May, June 1950.

416. Denninger, E., "Singulier comportement des chenilles de Scoparia crataegella Hbn." [In French]. Bull. Soc. Ent. Mulhouse, 1949: p.81. 1 Dec. 1949.

417. Diakonoff, A., "Klinische Lepidopterologie" [In Dutch; Clinical Lepidopterology]. Idea, vol.8: pp. 9-11. 8 May 1950. Two cases of moths causing annoyance and even injury to man are reported, viz. injury to human skin by contact with Scirpophaga innotata Wlk. (Pyralidae) resulting in violent itching and even inflammation, well-known and feared in S. Celebes, but also recorded from Singapore and Rangoon; and the peculiar and troublesome "habit" of Hyblaea puera Cr. (Hyblaeidae) when occurring large flights to penetrate into human ears! [A.D.]

418. Gibb, John, "The breeding biology of the Great and Blue Titmice." Ibis, vol.92: pp.507-539. 1 Oct. 1950. Includes data showing that the exact breeding season of these two birds in England is linked to the brief period of abundance of geometrid larvae Cheimatobia brumata and Hibernia defoliaria and that egg clutch size is proportional to larval abundance. [C.R.]

419. Eckholm, Svante, "Lepidopterologiska iakttagelser på Karlö-Hailuoto (Ob) sommaren 1947" [In Swedish]. Mem. Soc. Fauna Flora Fennica, vol.24: pp.65-69. 31 Dec. 1948. List of spp. collected. [P.B.]

420. Elofson, Olof,"Några intressanta insektfynd från Medelpad" [In Swedish]. Ent. Tidskr., vol.71: pp. 43-45. 28 May 1950. Notes on four Lepidoptera. [P.B.]

421. Fischer, Ch., "Quelques indications concernant l'élevage et l'hivernage de Odonestes pruni L." [In French]. Bull. Soc. Ent. Mulhouse, 1949: p.7. 1 Jan. 1949.

422. Fischer, Ch., "Colias hyale L. et C. alfacariensis f. calida Vrty." [In French]. Bull. Soc. Ent. Mulhouse, 1949: p.45. 1 June 1949.

423. Fearnehough, T.D., "Aberrant specimens of P. megera and P. aegeria." Ent. Rec. Journ. Var., vol.62: p.65, 1 pl. July-Aug. 1950. 2 specimens figured but not named. [P.B.]

424. Fischer, Ch., "Listes mensuelles pour la recherche des chenilles d'Eupithecia avec indication des plantes nourricières" [In French]. Bull. Soc. Ent. Mulhouse, 1949: pp.70-72, 80, 85-88; 1950: p.7. 1 Oct., 1 Nov., 1 Dec. 1949; 1 Jan. 1950.

425. Fischer, Ch., "Papilio machaon Linné" [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.34-37, 1 pl. 1 May 1950. Summary of races and 'forms'. [P.B.]

426. Fischer, Ch., "Chasse et élevage des Psychidae" [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.37-39. 1 May 1950.

427. Fischer, Ch., "P. podalirius Linné" [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.44-50, 1 pl. 1 June 1950. Summary of races and 'forms'. [P.B.]

428. Flaschentrager, B., and El Sayed Amin, "Chemical Attractants for Insects: Sex- and Food-Odours of the Cotton Leaf Worm and the Cut Worm." Nature, vol.165: p.394. 11 March 1950.

429. Forbes, William T.M., "Lepidoptera of New York and Neighboring States. Part II." Cornell Univ. Agr. Exp. Sta. Memoir, no.274: 263 pp., 265 figs. June 1948. See review in Lep. News, vol.3: pp.5-6.

430. Ford, E.B., "Industrial melanism." Proc. 8th Int. Genet. Congr., p.571. 1949. Abstract.

431. Gabriel, A.G., and A. Steven Corbet, "Results of the Armstrong College Expedition to Siwa Oasis (Libyan Desert), 1935, under the Leadership of Prof. J. Omer-Cooper. Lepidoptera Rhopalocera." Bull. Soc. Fouad Ier Ent., vol.23: pp.373-379. 1949. Notes on 12 spp. [P.B.]

432. Geiler, Ch., "Élevage de Philosomia canningii" [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.12-13. 1 Feb. 1950.

433. Geiler, Ch., "Comment éviter l'hivernage des chenilles? Un essai sur C. quercifolia L." [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.21-22. 1 April 1950.

434. Gorter, A.J., "Nieuwe Macrolepidoptera voor de Nederlandse fauna" [In Dutch; M. new for the N. fauna]. Ent. Berichten, vol.13: p.34, fig. 1 Mar. 1950. The capture in Holland of Apamea zollikoferi Freyer and Sedina büttneri Hering (Noctuidae) is recorded. [A.D].

435. Green, G.W., and C.R. Sullivan,"Ants Attacking Larvae of the Forest Tent Caterpillar, Malacosoma disstria Hbn. (Lepidoptera: Lasiocampidae)." Can. Ent., vol.82: pp.194-195. Sept. 1950.

436. Haggett, H.G., "The Life History and Habits of Zeuzera pyrina Linn. (aesculi Linn.) in Britain." Entomologist, vol.83: pp.73-81, 1 pl. Apr. 1950.

437. Hardonk, M., "Over de vleugelpigmenten der Pieriden en verwants stoffen (Lep.)" [In Dutch; on pigments in wings of Pieridae and on allied matter]. Verslag 81ste Intervergadering Nederl. Ent. Ver., pp.xi-xv. 1 Mar. 1950. A short review of pigments occurring in wings of Lepidoptera is given, with especial reference to pterins, being white, yellow and red pigments in wings of Pieridae. Pterins are biologically and physiologically active and are related with vitamins of the B-group, especially with folic acid; they have an important role in blood metabolism and may cure several forms of anaemia. They are also necessary for normal growth and development of certain bacteria and also of insects. [A.D.]

438. Harman, A.C., "Champaran Butterflies - North Bihar." Journ. Bombay Nat. Hist. Soc. vol.49: pp.93-100. Apr. 1950. Annotated list. [P.B.]

439. Harper, G.W., "Lepidoptera of West Sussex, 1949." Ent. Rec., vol.62: pp.25-27. Mar. 1950.

440. Harper, G.W., and W.E. Waller, "Notes on Breeding the First Generation of Polygonia c-album." Entomologist, vol.83: pp.145-148. July 1950. Color of adult determined by diet and rate of feeding. [P.B.]

441. Harrison, J.W. Heslop, "Observations on the ranges, habitats and variation of the Rhopalocera of the Outer Hebrides." Ent. Mo. Mag., vol.86: pp. 65-70. Mar. 1950. [P.B.]

442. Hedges, A.V., "A Note on the Life History of Madopa salicalis." Entomologist, vol.83: pp.97-98, 1 pl. May 1950.

443. Heller, J., St. Karpiak and I. Zubikowa, "Inorganic Pyrophosphate in Insect Tissue." Nature, vol. 166: pp.187-188. 29 July 1950. Deilephila euphorbiae. [P.B.]

444. Henstock, H., "Experiments with a Light Trap at Caerwys, North Wales, During the Years 1947, 1948 and 1949." Entomologist, vol.83: pp.175-188, 1 fig. Aug. 1950. Discusses relation of catch number to temperature and moonlight. [P.B.]

445. Heqvist, Karl-Johan, "Fjärilar från Vindelälvens dalgang inom Degerfors socken i Vasterbottens län" [In Swedish, German summary]. Ent. Tidskr., vol.71: pp.33-42, 2 figs. 28 May 1950. Annotated list of 279 spp. of macros from Hälnas in N. Sweden. Names two aberrations. [P.B.]

446. Hering, M., "Weiteres zur Raupenbiologie von Xanthoecia flavago (Schffm.) (Gortyna ochracea Hbn.)" [In German]. Ent. Zeitschr., vol.60: pp.17-18. 1 May 1950. Larvae of X. f. were found mining in leaf-stalk of Caltha palustris; the species is therefore considered as a facultative leaf-miner. [G.dL.]

447. Hirata, Y., K. Nakanishi, and H. Kikkawa, "Xanthopterin Obtained from the Skins of the Yellow Mutant of Bombyx mori (Silkworm)." Science, vol.111: pp. 608-609. 2 June 1950.

448. Holmes, J.W.O., "A Pale Variety of Lycaena phlaeas of Genetic Origin, and the Effect of Light Thereon." Entomologist, vol.83: pp.90-91. April 1950. Copper replaced by gold, which fades rapidly. [P.B.]

449. Horke, Arvid, "Cidaria berberata Schiff. i Sverige" [In German]. Ent. Tidskr., vol.71: pp.88-89. 28 May 1950.

450. Huggins, H.C., "Migrant Lepidoptera in 1949." Entomologist, vol.83: pp.88-89. Apr. 1950. Notes on 7 species. [P.B.]

451. Humbel, Emil, "Ergebnisse aus der Kreutzung parthenogenetischer und zweigeschechtlicher Schmetterlinge. IX. Analyse männchenahnlicher Intersexe von Solenobia triquetrella F. R." [In German]. Rev. Suisse Zool., vol.57: pp.155-235, 20 figs. Feb. 1950. Description of structure and development of chiefly ♂ intersexes from the cross diploid x tetraploid (parthenogenetic); presented as evidence for Seiler's theory of intersex formation.

452. Jacobson, L.A., P.E. Blakeley, and C.W. Farstad, "Observations on Feeding Habits of First-instar Larvae of the Pale Western Cutworm, Agrotis orthogonia Morr. (Lepidoptera: Phalaenidae)." Can. Ent., vol. 82: pp.181-185, 2 figs. Sept. 1950.

RECENT LITERATURE ON LEPIDOPTERA - cont.

453. Jucci, Carlo, "Physiogenetics in silkworms (Bombyx mori)." Proc. 8th Int. Genet. Congr., pp.286-297, 4 figs. 1949. Summary of research on artificial parthenogenesis, disease-resistant strains, etc. [P.B.]

454. Judd, W.W., "An assemblage of monarch butterflies (Danaus plexippus L.) on the north shore of Lake Erie." Journ. N.Y. Ent. Soc., vol.58: pp.169-171. Sept. 1950. [C.dP.]

455. Kalis, J.P.A., "On two Pieridae from Indonesia." Idea, vol.8: pp.45-46. 8 May 1950. Gives notes on Anaphaeis java java (L.) and Ixias reinwardtii balienses Fruhst., both in Bali. [A.D.]

456. Kanervo, Veikko, "On the Epidemiology of the Diamond Back Moth (Plutella maculipennis Curt.)" [In English, Finnish summary]. Ann. Ent. Fennici, vol. 14, suppl.: pp.154-159, 4 figs. 1949. Summarizes factors affecting outbreaks; a correlation with the sunspot cycle is suggested. [P.B.]

457. Kauffman, G., "Pyrgus centaureae Rbr. lineolata nov. (Lep. Hesperiidae)" [In German]. Ent. Zeitschr., vol.59: pp.177-180, 1 fig. 1 Mar.1950. Describes a new aberration of P. centaureae. [G.dL.]

458. Kettlewell, H.B.D., "Spilosoma lubricipeda L. ab. godarti Oberthür (Lep., Arctiidae) in Kirkudbrightshire." Ent. Mo. Mag., vol.84: p.128. June 1948. List of references to this genetic form. [P.B.]

459. Khalifa, A., "Spermatophore production in Galleria mellonella L. (Lepidoptera)." Proc. R. Ent. Soc. Lond. (A), vol.25: pp.33-42, 7 figs. 15 June 1950. Structure and function also described. [P.B.]

460. Kikkawa, Hideo, "Tryptophane Synthesis in Insects." Science, vol.111: pp.495-496. 5 May 1950. Bombyx mori. Process analogous to that in mammals. [P.B.]

461. Kiriakoff, S.G., "Recherches sur les organes tympaniques des Lépidoptères en rapport avec la classification. IV. Notodontidae." Biol. Jaarboek, vol. 17: pp.66-111, 12 figs. 1950. Continuing series of studies, describes the tympanal organs of 80 genera of Notodontidae, figuring 11. Evaluates various structures as of specific, generic, or supragenerie value. Concludes the family can be classified as follows: subfamily TARSOLEPIDINAE (nom.nov.), with genera Tarsolepis and Dudusa (which should probably each constitute a full tribe); subfamily Notodontinae, with tribe Pygaerini (only Pygaera), Gluphisia (position uncertain), and tribe Notodontini (all others studied). [C.R.]

462. Klein, A., "Colias F. alfacariensis Ribbé, forme calida Verity. Un gynandromorphe biparti" [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.33-34, 1 fig. 1 May 1950.

463. Kühn, Alfred, "Über die Determination der Form-, Struktur- und Pigmentbildung der Schuppen bei Ephestia kühniella Z." [In German]. Arch. Entwicklungsmech., vol.143: pp.408-487, 46 figs. 5 Jan. 1949.

464. Lederer, G., "Ein Beitrag zur Lebensweise und Verbreitung von Dichonia areola Esp. in der Umgebung von Frankfurt am Main" [In German]. Ent. Zeitschr., vol.59: pp.185-187; vol.60: p.8. 15 Mar., 1 Apr. 1950. A short description of the distribution, biology, and ecology of D. areola in the neighborhood of Frankfurt/Main. [G.dL.]

465. Lempke, B.J., "Trekvlinders in 1949" [Migratory Lepidoptera in 1949, in Dutch]. Ent. Berichten, vol.12: pp.129-134, figs. 1-5. 1 Sept. 1950. In this tenth annual report 9 species are recorded and diagrams on flights of Colias hyale, C. croceus, Vanessa atalanta, V. cardui, and Issoria lathonia are given. [A.D.]

466. Lempke, B.J., "Een opvallende reactie van Pieriswijfjes" [In Dutch; Conspicuous reaction of females of Pieris]. Ent. Berichten, vol.13: pp.20-21. 1 Feb. 1950. Very little is known about the behavior of common butterflies. Reaction of female Pieris upon the approach of a male by clapping the wings down and lifting the abdomen is generally regarded as a prelude to the mating. The author remarks, however, that the female insect reacts upon any disturbance in the same way. [A.D.]

467. Lempke, B.J., "Sedina büttneri Hering" [In Dutch; English summary]. Ent. Berichten, vol.13: pp.34-36, figs.1-2. 1 Mar. 1950. The first Dutch specimens of Sedina büttneri Hering, were taken in Oct. 1948 on a damp meadow near Eindhoven (Prov. of N. Brabant); two other specimens were captured in Sept. 1949 near Swalmen (Prov. of Limburg). Sketch map with collecting localities is added. [A.D.]

468. Lempke, B.J., "Nomenclatuur" [In Dutch; Nomenclature, with an English summary]. Ent. Berichten, vol. 13: pp.53-54. 1 Apr. 1950. The specific nomenclature of the "scarce vapourer" is greatly confused. The first valid name appears to be Gynaephora recens Hübner 1819. The name used in the modern English nomenclature, Orgyia recens Hbn., is correct as far as the trivial name is concerned. [A.D.]

469. de Lucca, C., "Casual Immigrant Rhopalocera in Malta." Entomologist, vol.83: pp.64-65. Mar. 1950.

470. McCreary, Donald, and Paul L. Rice, "Parasites of the European Corn Borer in Delaware." Ann. Ent. Soc. Amer., vol.42: pp.141-153. June 1949. Mainly devoted to recoveries of 5 spp. of released parasites. 3 native spp. recorded. [P.B.]

471. McGuffin, W.C., "Descriptions of Larvae of Forest Insects. Plagodis, Anagoga, Hyperetis (Lepidoptera: Geometridae)." Can. Ent., vol.82: pp.205-210, 1 fig. Oct. 1950. Describes larvae of three spp. of Plagodis and of one of each of the other genera. Key to genera. [P.B.]

472. Madsen, F., "Light-trap catching by ultraviolet rays." Ent. Meddelelser, vol.25: pp.221-225, 3 figs. 15 June 1948. Reports automatic trap more effective with UV than with visible light. [P.B.]

473. Menesse, N.H., "Butterflies of Sind." Journ. Bombay Nat. Hist. Soc., vol.49: pp.20-24. Apr. 1950. Annotated list. [P.B.]

474. Merritt, James R., "List of the Butterflies of Jefferson County, Kentucky." Annals Kentucky Nat.Hist., vol.1: pp.27-32. 30 Oct. 1948. Preliminary checklist of 64 spp. with dates and localities. [C.R.]

475. van der Meulen, G.S.A., "Zeldzame of bijzondere Macrolepidoptera" [In Dutch; Rare and noteworthy L.]. Verslag 81ste Wintervergadering Nederl. Ent. Ver., pp.iv-v. 1 Mar. 1950. Occurrence in the Netherlands in 1948 of seven rare or noteworthy Macrolepidoptera is recorded. [A.D.]

476. Milne, Lorus J., and Margery J. Milne, "Camouflage in Nature." Natural Hist., vol.59: pp.156-163, 24 figs. April 1950. Good figures of several Lepidoptera with concealing coloration. [P.B.]

477. Milne, Lorus J. and Margery J., "Hoax or Fair Warning." Natural History, vol.59: pp.222-227, 239, 13 figs. May 1950. Popular account of mimicry and concealing or warning structure in insects. [P.B.]

478. Munroe, Eugene G., "The dina group of the genus Eurema in the West Indies (Lepidoptera, Pieridae)." Journ. N.Y. Ent. Soc., vol.58: pp.172-191. Sept. 1950. Contains a key to the species and describes as new Eurema chamberlaini inaguae (Great Inagua, Bahama Is.). Types in Museum of Comp. Zoology.

(cont. next page)

These difficult butterflies have seasonal and sexual forms each of different shades or colors, and some names have been proposed from one or two specimens or very short series. The shuffling of names continues. The North American representative of this group, (so.Florida and so.Texas), is E. neda neda Latr., according to Munroe. It is a pity that such a careful work should have no illustrations, thus losing much of its value. [C.dP.]

479. Musgrave, A., "Some Butterflies of Australia and the Pacific. The Swallowtails - V." Australian Mus. Mag., vol.9: pp.104-108, 7 figs. 1947. Brief account of the eurypylus group. [P.B.]

480. Newton, J., "Prolonged duration of the pupal stage in certain moths." Ent. Rec., vol.62: pp.49-50. May 1950.

481. Nixon, G.E.J., "New Indian Braconidae bred from Lepidopterous defoliators (Hymenoptera)." Ann. Mag. Nat. Hist., 12th ser., vol.3: pp.453-474, 19 figs. June 1950. 8 parasite spp. described. [P.B.]

482. Nüesch, H., "Zur Entstehung des Sexualdimorphismus bei Psychiden" [In German]. Arch. Julius Klaus-Stiftung, vol.23: pp.577-581, 1 fig. 28 Feb. 1949. Eye and antennal development described in both sexes of Fumea casta. [P.B.]

483. Obraztsov, N., "Über die arabescana (Ev.) - Gruppe der Gattung Pseudeucosma Obr." [In German]. Mitt. Münch. Ent. Ges., vol.35/39: pp.213-224, 7 figs. 1 Aug. 1949. Discusses the species of this group and figures ♂ genitalia of most of them. Describes as new: P. dagestana (Ussuch-tshaj, Achty, Dagestan). [G.dL.]

484. Olivier, R., "Sur l'hivernage et l'élevage de deux chenilles de Gastropacha populifolia Esp." [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.5-7. 1 Jan. 1950.

485. Olivier, R., "A propos de Zygènes qui apparaissent à des époques différentes." [In French]. Bull. Soc. Ent. Mulhouse, 1950: p.17. 1 Mar. 1950.

486. Owen, D.F., "The Butterflies of Greenwich Park." Ent. Rec. Journ. Var., vol.62: pp.15-16. Feb. 1950.

487. Ozorski, E., "A propos d'une seconde génération de G. quercifolia L." [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.25-26. 1 April 1950.

488. Ozorski, E., "A propos du phénomène d'appel chez certaines femelles de papillons" [In French]. Bull. Soc. Ent. Mulhouse, 1949: pp.36-39. 1 May 1949.

489. Palmén, Ernst, "A migration of Vanessa io (Lep., Nymphalidae), with remarks on its occurrence in Finland" [In English, Finnish summary]. Ann. Ent. Fennici, vol.14, suppl.: pp.160-168, 2 maps. 1949.

490. Peking, F., "Ein praktischer Zucht - und Anflugbehälter" [In German]. Ent. Zeitschr., vol.60: pp. 21-22. 1 May 1950. Gives a short description of a cheap rearing-box which can be folded up. [G.dL.]

491. Piepho, Hans, "Uber das Ausmass der Artunspezifität von Metamorphosehormonen bei Insekten" [In German]. Biol. Zbl., vol.69: pp.1-10, 2 figs. 1950. Implantation of corpora allata from 5 insects of 3 orders in Galleria larvae produced similar suppression of metamorphosis; the hormone produced is probably similar or the same in all these insects. [P.B.]

492. Piepho, Hans, "Uber die Hemmung der Falterhäutung durch Corpora allata. Untersuchung an der Wachmotte Galleria mellonella l." [In German]. Biol. Zbl., vol.69: pp.261-271, 5 figs. 1950. Implantation of corpora allata antagonizes differentiation of pupal and imaginal integument, resulting in animals with integument modified toward the larval or pupal condition. [P.B.]

493. van Regteren Altena, C.O., "Is Melitaea didyma (Esper, 1779) in Nederland gevangen?" [In Dutch]. Ent. Berichten, vol.12: pp.374-375. 1 May 1949.

494. Rindge, Frederick H., "A Revision of the Geometrid Genus Sericosema (Lepidoptera)." Amer. Museum Novitates, no.1468: 30 pp., 7 figs. 18 Oct. 1950. Describes in detail the structure, wing pattern and ♂ and ♀ genitalia of this western American genus and its 4 species: juturnaria; immaculata; wilsonensis; and simularia. Figures clearly the ♂ and ♀ genitalia of all 4 spp. Describes as new: subsp. macdunnoughi (Lillooet, B.C.) of wilsonensis. Shows distribution of all spp. and subspp. on maps. Sinks californiaria Pack. as synonym under juturnaria; reduces argentata C. and S. to subsp. of immaculata, and meadowsaria Sp. to subsp. of wilsonensis. A model paper! [C.R.]

495. Rindge, Frederick H., "A Revision of the North American Species of the Genus Syrrhodia (Lepidoptera, Geometridae)." Amer. Museum Novitates, no.1469: 26 pp., 6 figs. 20 Oct. 1950. Sinks Catopyrrha Hbn. as generic synonym. Describes in detail the structures, wing pattern, and ♂ and ♀ genitalia of the genus and the spp.: decrepitaria esperanza; viridirufaria; cruentaria; and sphaeromacharia. Figures clearly the ♂ and ♀ genitalia of all 4 spp. Gives maps of distribution. Describes in detail larva of cruentaria (food - Ceanothus americanus). Another thorough paper! [C.R.]

496. Risler, Helmut, "Kernvolumenänderungen in der Larvenentwicklung von Ptychopoda seriata Schrk." [In German]. Biol. Zbl., vol.69: pp.11-28, 15 figs. 1950. Cyclic changes and increased nuclear size due to polyploidy (polyteny?) in various tissues of P. seriata larvae are described. [P.B.]

497. Roepke, W., "Aantekeningen over Synonymie" [In Dutch; Notes on Synonymy; with an English summary]. Ent. Berichten, vol.13: pp.25-28. 1 Feb. 1950. The synonymy of Malayan Heterocera is settled as follows: Chadisra madena Schaus = Fentonia (?) orbifer Hps.; Spatalia bronacha Schaus = Spataloïdes gemmifera Moore; Turnaca straminea Rpke. = T. acuta Wlk.; ♂ Pygaera capucina Rpke. = P. angularis Sn.; Brahmaea hearseyi luchti Dup. = B. h. ardjoeno Kalis; Suana riemsdijki Heyl. = S. concolor Wlk. (auct.); Actias selene miae Tox. = A. s. seitzi Kalis; Bombyx (Lebeda) rotundata Heyl. = Metanastria aequizonata Grünb. = M. rotundata Heyl. [A.D.]

498. Ross, H.H., "How to Collect and Preserve Insects." Ill. State Nat. Hist. Survey Circ. no.39: 59 pp., 65 figs. July 1949. Convenient handbook. Includes brief description of each order. [P.B.]

499. van Rossem, G., "Verslag over het optreden van enige schadelijke insecten in het jaar 1948" [In Dutch; Report on occurrence of some injurious insects in 1948]. Verslag 8e Herfstvergadering Nederl. Ent. Ver., pp.xcii-cviii. 1 Aug. 1948 (Also in Tijdschr. van Entom., vol.91). On pp.xcii-xciv is discussed the occurrence in the Netherlands of two Gelechiids: Sitotroga cerealella Oliv., a notorious pest of stored seeds and grain is recorded for the first time from a field crop of oats; and Anarsia lineatella Zell., new for the fauna, appears to be a serious pest in greenhouses of prunes and peaches. [A.D.]

500. Russell, A.G.B., "Records of Dorset Lepidoptera for the year 1945." Journ. Soc. Brit. Ent., vol.3: pp.92-96. 5 Mar. 1949.

501. Sanborn, Richard C., and Carroll M. Williams, "The cytochrome system in the cecropia silkworm, with special reference to the properties of a new component." Journ. Gen. Physiol., vol.33: pp.579-588, 3 figs. 20 May 1950. Discusses 'cytochrome x' which apparently replaces cytochromes b and c in most larval tissues. [P.B.]

502. Saundby, Robert, "Collecting in 1947." Proc. and Trans. So. London Ent. and Nat. Hist. Soc., 1947-48: pp.196-202. Mar. 1949. Lepidoptera in England. [P.B.]

RECENT LITERATURE ON LEPIDOPTERA - cont.

503. Schaller, F. and C. Timm, "Das Hörvermögen der Nachtschmetterlinge" [In German]. Zeits. vergl. Physiol., vol.31: pp.468-481. 19 June 1950. Studies of 38 spp. of nocturnal moths revealed in all of them sensitivity and defence reactions to sounds in the frequency range of the sounds bats make to orient themselves. An exciting discovery of a generally unsuspected adaptation in moths! [P.B.]

504. Schultz, V.S.M.,"Neue Beiträge zur Schmetterlingskunde. 2. Die Raupe von Cacoecia reticulana Hb. als Phirsichmade" [In German]. Entom. Zeitschr., vol.59: pp.9-12. 15 Apr. 1949. C. reticulana once was found mining in a peach. Description of the larva and pupa. [G.dL.]

505. Seiler, J., "The origin of parthenogensis in the Psychids (Lepid.)." Proc. 8th Int. Genet. Congr., pp.659-660. 1949. Abstract.

506. Sevastopulo, D.G., "Recent Changes in the Names of Some East African Butterflies." Nature in E. Africa, ser.2, no.1: pp.9-10. May 1949.

507. Sevastopulo, D.G., "Specific Names of the Two Common Indian Colias Butterflies." Journ. Bombay Nat. Hist. Soc., vol.49: p.131. Apr. 1950.

508. Sevastopulo, D.G., "Notes on the Genetics of Some East African Lepidoptera." Entomologist, vol. 83: p.164. July 1950. Note on a brood of Mylothris chloris clarissa. [P.B.]

509. Shakhbazov, V.G., and M.D. Sirotenko, "Metodika izucheniia sutochnoi aktivnosti lichinochioi stadii babochek (Lepidoptera)" [Methods for studying the diurnal activity of butterfly larvae][In Russian]. Doklady Akad. Nauk SSSR, vol.65: pp.585-588. 1949.

510. Slaby, Otto, "Quelques dates faunistiques de la Bohême" [In Czech, French summary]. Acta Soc. Ent. Čechosloveniae, vol.46: pp.65-72, 6 figs. 1 Feb. 1949. Notes on 47 spp. Names 1 aberration. [P.B.]

511. Smith, Stanley G., "Isolation mechanisms operating between populations of Choristoneura fumiferana on different host trees." Proc. 8th Int. Genet. Congr., pp.667-668. 1949. Abstract.

512. Snyman, A., "The influence of population densities on the development and oviposition of Plodia interpunctella Hübn. (Lepidoptera)." Journ. Ent. Soc. So. Africa, vol.12: pp.138-171, 5 figs. Sept. 1949. Also describes a protozoan disease found in the cultures. [P.B.]

513. Soures, B., "Contribution à l'étude des Lépidoptères de la Tunisie. Biologie des espèces nuisibles ou susceptibles de la devenir." Ann. Service Bot. et Agron. Tunisie, vol.21: 213 pp., 44 pls., 2 figs. 1948. Account of macro-lepidoptera actually or potentially injurious to agriculture. Describes egg, larva, cocoon, adult, and biology, if known, of 63 spp., mostly Noctuidae, with large photographs of wings of each. [C.R.]

514. Steeg, M., "Neu für die Fauna Frankfurt am Main" [In German]. Ent. Zeitschr., vol.60: p.24. 1 May 1950. Records the nigristic mutation ferenigra of Aglia tau from Frankfurt/M. [G.dL.]

515. Steinberg, D.M., "Sravnitel'naia otsenka regenerativnykh vozmozhnostei u nacekomyk (Comparative evaluation of regenerative possibilities in insects)" [In Russian]. Zool. Zhurn., vol.29: pp.267-276, 1 pl., 2 figs. 1950.

516. Steinberg, D.M., "Massovye vidy nasekomykh i gryzunov kak vozmozhnye vrediteli lesnykh polezashchitnykh polos v priural'e" [Species of insects and rodents, occurring in great numbers, possibly injurious to forest strips used as protection for fields in the pre-Ural area; In Russian]. Zool. Zhurn., vol.29: pp.7-15. 1950. Some Lepidoptera mentioned.

517. Stempffer, H., "Contribution à l'étude des Lycaenidae de la faune éthiopienne." Ann. Soc. Ent. France, vol.114: pp.77-84, 12 figs. "1945" (1949?). Reports on studies of types of Aurillius' spp. of African Lycaenidae in Stockholm. Describes and figures ♂ genitalia of types of: Lachnocnema magna; Deudorix violetta; Iolaus laonides; I. bryki (becomes race of Epamera hemicyanus); I. agnes; I. bicaudatus; I. obscurus; I. scintillans; Poecilmitis osbecki (becomes form of Phasis thysbe); Cupidesthes robusta; Cupido loveni (becomes synonym of Lepidochrysops parsimon). States that Aphanaeus spindasoides is a race of Spindasis aderna. Figures ♂ genitalia of I. australis Stev. [C.R.]

518. Stempffer, H., "Contribution à l'étude des Lycaenidae éthiopiennes" [In French]. Rev. Franc. Ent., vol.17: pp.135-149, 7 figs. 30 June 1950. Describes as new: Eresinopsides bichroma jefferyi (Kenya); Epamera jacksoni (Kenya); Neurypexima kalinzu (Uganda); also one form. Descriptive notes on other spp. [P.B.]

519. Stroyan, H.L.G., "Spiders and Melitaea athalia." Entomologist, vol.83: pp.231-233. Oct. 1950.

520. Ter Laag, H., "Phalanta phalantha (Drury) in West Java" [Lepid., Nymphal.]. Idea, vol.8: p.12. 8 May 1950. This butterfly, characteristic for warm plains, is reported from Bandung (West Java) at 900 meters altitude where caterpillars were found on a Salix sp. [A.D.]

521. Tindale, Norman B., "New Satyridae of the Genus Oreixenica from South Australia and New South Wales, together with Notes on the Recent Climate of Southern Australia." Records S. Australian Mus., vol.9: pp. 143-156, 1 pl. 31 May 1949. Describes as new: O. kershawi kanunda (S. Australia); O. k. phryne (N. S. Wales). [P.B.]

522. Toumanoff, Constantin, "Réactions de défense chez les chenilles de Fausses teignes des ruches, parasitées par un Sporozoaire (Coelogregarina ephestiae Ghél)." C.R. Acad. Sci., vol.228: pp.506-508, 3 figs. 7 Feb. 1949. Reactive tissues, probably phagocytic, in infected larvae of the wax moths Achroia and Galleria. [P.B.]

523. Toxopeus, L.J., "Hybridisatie op Krakatau" [In Dutch; Hybridization in the Krakatau Islands]. Idea, vol.8: pp.12-13. 8 May 1950. Collecting during a short stay in this group of islands corroborated the view that this region represents a mixture of Javan and Sumatran faunas. It is probable, however, that immigration of Javanese elements in these islands took place not directly but via South Sumatra. [A.D.]

524. Toxopeus, L.J., "Entomologische notities uit Nieuw-Guinea 21" [In Dutch]. Idea, vol.8: pp.24-30, 1 pl. 8 May 1950. Field notes of 3rd Archbold Expedition, continued. [A.D.]

525. Toxopeus, L.J., "Onthe distribution of Delias crithoë (Boisd.) in Java (Lep. Pieridae)." Idea, vol. 8: pp.30-45, 1 fig., 1 pl. 8 May 1950. Gives elaborate account of distribution, key, zoogeographical considerations and redescriptions of the following subspecies: crithoë (Boisd.), with varieties fastosa Fruhst. and funesta Fruhst., cherima Tox., centralis Tox., radiata Tox., dymas Nic., bromo Fruhst.; describes new subsp. perextensa (West Java). [A.D.]

526. Travassos, Lauro, "Contribuçăo ao conhecimento dos 'Arctiidae'. XXI. Sóbre as espécies de coloracão semelhante a 'Idalus admirabilis' (Cramer, 1777)." [In Portuguese]. Rev. Brasil. Biol., vol.10: pp. 217-240, 61 figs. July 1950. Deals exhaustively with 6 similar-appearing spp. of Idalus and Rhipha. [P.B.]

527. Travassos, Lauro, "Contribução ao conhecimento dos 'Arctiidae'. XIX. (Lepidoptera, Heterocera)" [In Portuguese]. Rev. Brasil. Biol., vol.9: pp.443-462, 53 figs. Dec. 1949. Describes as new: PSEUDOTESSELARCTIA (type Phaegoptera ursina); LEPIDOZIKANIA (type Tesselarctia cinerascens); L. similis (Brazil). Redescribes Tesselarctia, T. semivaria, and the above two types; all descriptions complete and beautifully illustrated. [P.B.]

528. Tronícek, Edvard, "Contribution à la connaissance des Lépidoptères de la Tchécoslovaquie" [In Czech, French summary]. Acta Soc. Ent. Čechosloveniae, vol. 46: pp.50-51. 1 Feb. 1949. Records 2 aberrations. [P.B.]

529. Ureta, Emilio, "Lepidopteros de Chile (Rhopalocera). IV Parte. Familia Lycaenidae." [In Spanish]. Bol. Mus. Nac. Hist. Nat., Chile, vol.24: pp.93-123, 2 pls. 1949. Lists 19 forms. For each, gives original description (amplified in some cases), distribution, source and present location of type specimens, and larval food plants (where known); also an artificial key to the species. All but one are illustrated in color. Describes as new: Thecla kuscheli; Leptutes trigemmatus borealis; Scolitantides andina f. horsti; also names 1 aberration. [P.B.]

530. Verhaak, W., "Heteropterus morpheus Pall. opnieuw in Nederland gevonden" [In Dutch; H.m. found in Holland again]. Ent. Berichten, vol.13: p.49. 1 Apr. 1950. This lepidopteran, not recorded since 1860, is found again in Prov. of North Brabant. [A.D.]

531. Viette, P., "Contribution à l'étude des Hepialidae. (15e Note). Genres et espèces de l'Amerique latine" [In French]. Rev. Franç. Ent., vol.17: pp. 52-62, 11 figs. 31 Mar. 1950. Describes as new: ROSEALA; R. bourgognei (Brazil); MACULELLA (type M. noctuoides); M. chilensis (Chile); M. variabilis (Chile); SCHAEFFERIANA (type Troidia epigramma); S. jeanneli (Brazil); S. biedermanni (Brazil). Notes on several other spp. [P.B.]

532. Viette, P., "Contribution à l'étude des Hepialidae. (19ème note)" [In French]. Ent. Tidskr., vol. 71: pp.144-146, 4 figs. 13 Oct. 1950. Erects BLANCHARDINA (type Hepialus venosus) and EUDALACA (type exul Walker). [P.B.]

533. Warnecke, G., "Wie stark kann die Einschränkung eines Lebensraums für eine bestimmte Schmetterlingsart ohne Gefährdung des Bestands werden?" [In German]. Ent. Zeitschr., vol.60: pp.9-13, 18-21. 15 Apr., 1 May 1950. Discusses problem of connection between Lepidoptera and size of their biotopes. For every species this question has to be answered differently. Beside a number of species which need a larger biotope (Colias spp.), many others are known which can exist in a very restricted area (e.g., Erebia christi, Pararge roxelana). Discusses as an example a population of Cyaniris argiolus near Hamburg and analyses conditions which determine range of its biotope. [G.dL.]

534. Warren, B.C.S., Supplementary Data on Problems Relating to Erebiid Butterflies." Entomologist, vol.83: pp.225-230. Oct. 1950. Describes as new: Erebia cassioides transcaucasica (Caucasus). Two other notes. [P.B.]

535. Weidman, Margot, "An Interesting Abnormality in a Polyphemus Moth." Chicago Acad. Sci. Nat. Hist. Misc., no.31: 2 pp., 1 fig. 21 Oct. 1948.

536. Weiss, Harry B., and William M. Boyd, "Insect feculae." Journ. N.Y. Ent. Soc., vol.58: pp.154-168, pls.14-16. Sept. 1950. This interesting paper on the excrement of insects is devoted mostly to Lepidoptera. It opens a wide field for further research. [C.dP.]

537. Wigglesworth, V.B., "The insect cuticle." Biol. Revs., vol.23: pp.408-451. Oct. 1948. Review article. Covers chemical and physical properties of the cuticle, its formation and moult, and its relations with the epidermis and other tissues. [P.B.]

538. Wilkes, A., H.C. Coppel, and W.G. Mathers, "Notes on the insect parasites of the spruce budworm Choristoneura fumiferana (Clem.) in British Columbia." Canad. Ent., vol.80: pp.138-155, 1 fig. 1948. Lists 64 spp., 18 new for this host. [P.B.]

539. Wiltshire, E.P., "Middle East Lepidoptera, IX: Two New Forms or Species and Thirty-five New Records from Cyprus." Ent. Rec. Journ. Var., vol.60: pp.79-87, 1 pl., 3 figs. July-Aug. 1948. Describes as new: Cochlidion creticum drayi; Hemerophila trypaneria. Considers Pseudoterpna 'ab.' rectistrigaria a good species. Figures specimens and ♂ genitalia of all three. New records and notes on other spp.; some food plants listed. [P.B.]

540. Wiltshire, E.P., "Some notes on the Shatt el Arab oasis and its insects." Ent. Rec., vol.62: pp. 37-40, 45-49. Apr. May 1950. Mainly Lepidoptera. [P.B.]

541. van Wisslingh, T.H., "Macrolepidoptera in 1949" [In Dutch]. Ent. Berichten, vol.13: pp.18-20. 1 Feb.1950. Faunistic and phenological notes on Macrolepidoptera in Holland in the summer of 1949. [A.D.]

542. van Wisselingh, T.H., "Vangsten van Macrolepidoptera in 1948" [In Dutch; Captures of M. in 1948]. Verslag 81ste Wintervergadering Nederl. Ent. Ver., pp.xiii-x. 1 Mar. 1950. The summer of the year 1948 has been unfavorable for collecting; wet and cold. Still several rare species were collected of which eleven are recorded. [A.D.]

543. Wolff, Paul, "Quelques observations biologiques relatives à l'espèce Lasiocampa quercus L." [In French]. Bull. Soc. Ent. Mulhouse, 1950: pp.51-52. 1 July 1950.

544. Wolsky, Alexander, "The Physiology of Development in Insects." Proc. Nat. Acad. Sci. India, vol.15: pp.67-72. Feb.-Mar. 1949. Outlines changes in metabolic rate during development of Bombyx. [P.B.]

545. de Worms, C.G.M., "British Lepidoptera Collecting 1948." Entomologist, vol.82: pp.121-129. June 1949. A 'season summary'. [P.B.]

546. de Worms, C.G.M., "British Lepidoptera Collecting, 1949." Entomologist, vol.83: pp.99-104, 134-140. May, June 1950.

547. Wright, D.W., and Q.A. Gearing, "The Biology and Control of the Pea Moth, Laspeyresia nigricana, Steph." Bull. Ent. Res., vol.39: pp.57-84, 1 pl., 6 figs. May 1948.

548. Yamafuji, Kazuo, "Conversion of Nitrites into Oximes in Silkworms and its Relation to the Experimental Production of Virus Disease." Nature, vol.165: pp.651-652. 22 April 1950. Addition of nitrites to diet increased oxime content of larvae and was correlated with high mortality of uninfected larvae from 'virus' disease. Utilization of inorganic nitrogen salts not previously reported for Metazoa. [P.B.]

549. Youden, G.H., "Hadena compta at Dover (Lep.: Noctuidae)." Entomologist, vol.83: pp.121-122, 1 pl. June 1950.

550. Zolotarev, E.Kh., "O razvitu gusenits boiar'-shnits' (Aporia crataegi L.) v period zimovki (On the development of the larva of the Black-veined White)" [In Russian]. Zool. Zhurn., vol.29: pp.152-158. 1950.

551. Zukowsky, B., "Zwei neue südamerikanische Aegeriiden" [In German]. Ent.Zeitschr.,vol.60:pp.22-23. 1 May 1950. Describes as new from S. America: Chamaesphecia atramentaria (Vulcan Colima, Peru) and Gaea erasmia (Chile). Very short descriptions; no figs. [P.B.]

NOTICES BY MEMBERS

Wanted: Rhopalocera from Africa, Asia, and Oceania in exchange for Rhop. and larger moths from Spanish and European faunas. Very particularly desire all Papilionidae, Delias, Euploea, Cethosia, Charaxes, Kallima, Euphaedra, Euxanthe, and Appias. All correspondence welcomed and answered. A. Varea de Luque, 13 Ibiza, Madrid, SPAIN.

I am considering a collecting trip to the Hudson Bay region of Canada next summer but it will be necessary to sell part of my catch to defray expenses. Write me if you would be interested in purchasing Lepidoptera, Odonata, or Coleoptera from this area. C.S. Quelch, Transcona, Manitoba, CANADA.

Western U.S.A. Lepidoptera offered in exchange for tropical spp., esp. from India, and for Speyeria diana and Anaea spp. Mrs. Emily Henriksen, Route #1, Sunnyside, Washington.

For sale or exchange: approximately 300 Manitoba moths especially Arctiidae and Noctuidae. All are pinned. What offers? Charles D. Bird, 1930 Rosser Ave., Brandon, Manitoba, CANADA.

Speyeria diana ♂ caught this season for sale or exchange for tropical Lepidoptera or Coleoptera. Also have a limited number of Mitoura damon. Theodore Bock, 70 Ehrman Ave., Cincinnati 20, Ohio.

For exchange or sale: the very rare Strymon "auretorum" (Bdv.). Also Speyeria. Wm. T. Meyer, 4450 Kingswell Ave., Los Angeles 27, Calif.

Far Eastern Rhopalocera (Japan, Formosa, Korea, etc.) Wish to exchange with all parts of the world. Have interest in Papilionidae (esp. Parnassius, Archon, Hypermnestra, Zerynthia, etc.), Pieridae, Nymphalidae, and Lycaenidae, etc. Inquiry invited. Yoshihiko Hata, No.594, Aburanocouji Buccouji,Kyoto,JAPAN.

For sale: THE BUTTERFLIES OF GEORGIA, 1950 revised edition with annotated list, complete bibliography. Limited number, just published, $1.00. Order from Lucien Harris, Jr., President, Georgia Society of Naturalists, 61 Clarendon Ave., Avondale Estates,Ga.

Amazon Butterflies from Santarém, Obidos, Manaos, and Tefé. Young Swiss on collecting trip wishes to sell his duplicates to help defray expenses. Will be on home leave in Switzerland from December 1950 on. Please let me know your wishes. Jorge Kesselring, Weinbergstr. 166, Zürich 6, SWITZERLAND.

Complete set of BULL. LEP. SOC. JAPAN, vol.1, nos. 1,2,3, and 4 (108 pp.) (1946) - for sale, 70 cents, including postage. Hiroshi Inoue, 290 Miyamae, Okamachi, Minami-ku, Yokohoma, JAPAN.

Butterflies from Ecuador and Argentina. If you are interested as an amateur or a specialist in material collected by William Clark-Macintyre in Ecuador or Juan Foerster in Argentina and Paraguay, write for information and price-lists from F.M. Brown, Fountain Valley School, Colorado Springs, Colorado.

Young man, 22, seeking a position collecting or preparing entomological material. Will travel to desired localities to collect your needed species.

* * *

Duplicates of many groups of insects for exchange (full data, papered), from Panama, Cuba, Japan. Large no. Japan Lycaenidae. Want tropical Lycaenidae, esp. from remote countries; list made up on request. Raymond Jablonski, 920 E. Knapp St., Milwaukee 2, Wis.

Speyeria specialists! Rare endemic species from Atlas Mts. of Morocco, S. (Argynnis) lyauteyi Obth. 2♂♂ 1♀ $5.00, ♂ $1.50 each. Also many other rarities - Satyrus abdelkader, S. atlantis (mniszechii), Epinephele maroccana, Coenonympha vaucheri, C. fettigii, Cigaritis allardii, Heodes alciphron herakleana, H. phoebus, etc. Exchange for arctic U.S. Rhopalocera also considered. Colin W. Wyatt, Cobbetts, Farnham, Surrey, ENGLAND.

For exchange: The Periodic Cicada, Tibicina septendecim, with all data, for Lepidoptera, particularly Papilionidae and Sphingidae. Large number of cicadas available. Will also sell. J.W. Morris, 2704 W. Genesee St., Syracuse 9, New York.

For sale: Rhopalocera from Africa. Have Papilio, Charaxes, and other genera. Send for list. Prices are low. Charles Seydel, B.P. #712, Elisabethville, Belgian Congo, AFRICA.

Austrian insect pins for sale, excellent quality. Sizes 2,3, and 4. 55¢ per 100 of a size, $4.00 per 1000 of a size. L.S. Phillips, 1839 S. Hamlin Ave., Basement Apt., Chicago 23, Illinois.

Wanted: Volumes 5, 7 and 9 of Seitz' "Macrolepidoptera of the World" (English Transl.). Bro. J.J.Renk, Regis College, W. 50th at Lowell Blvd.,Denver 11, Colo.

For sale: Cisseps fulvicollis, Ateva aurea, 10¢ each, with full data. Also unnamed moths, 6¢ each; will exchange for exotic Rhopalocera with full data. James Unseld, Jr., Gravel Switch, Kentucky.

LIVING MATERIAL

Hyalophora cecropia, H. promethea and Antheraea polyphemus cocoons for exchange for living, mounted, or papered Lepidoptera, esp. Papilionidae and Sphingidae. Will sell H. cecropia only. J.W. Morris, 2704 W. Genesee St., Syracuse 9, N.Y.

Large quantities of wild (Conn.) cocoons of Samia walkeri ("Cynthia") and other Heterocera offered in exchange for living pupae of Lepidoptera from outside New England, especially from Europe or Asia. R.W. Pease, Jr., Yale Station, New Haven, Conn.

For sale or exchange: Eupackardia (Callosamia) calleta cocoons. Robert J. Ford, 3266 Ardmore Ave., South Gate, Calif.

Desire to correspond about rearing with view to exchange of ova next season, esp. Sphingidae and Saturniidae. Mrs. Hazel Chase, 272 N. Union St., Galion, Ohio.

QUESTIONS AND ANSWERS

Q. "Where may I find directions for the preparation of Lepidoptera ♂ and ♀ genitalia for study?"

A. See J.F. Gates Clarke in Bull. Brooklyn Ent. Soc., vol.36: pp.149-161; 1941. As he notes, many make variations in the process he uses, though none in the principles stated there. My preferences are:

Put label (if only one) at left, leaving right end clear for handling the slide, and attach it to read from the side. Hollow-ground slides are too expensive for anyone without the government behind him. I prefer posts of hard thick card or celluloid to rings, - the balsam dries better. They should be well soaked in clearer before using.

In many cases, especially Noctuidae on account of the tufting, I prefer to remove only the posterior half of abdomen if possible (i.e. males, where the genitalia are short), to save the basal structures at least in recognizable form. One can often put a small drop of alcohol on the end of the abdomen, and add a drop of water when it has spread half way to the base. But sometimes it spreads too far and relaxes the specimen, or a decomposed specimen refuses to soften enough for cutting. I prefer oil of lavender to clove oil, as it is less volatile, and is clear on the slide. There is less danger of the positioning of the structures being lost. I write the permanent label for the slide at the start, eliminating the risk of error in copying a temporary label. Then I carry it along with the specimen in a dry watch-glass. I prefer eosin to mercurochrome, and would give a warning that in males where the membranous structures rarely show significant characters it is usually best not to stain.

For the potash stage I prefer to use it pretty hot but not boiling, and often put the specimen on a hot steam radiator. Then instead of the minute or two for boiling KOH or several hours for cold, the best time is usually some minutes to an hour or so. If boiling potash is used, the specimen should be boiled up first in water till well softened.

It is best not to clean the outer surface of the pelt too thoroughly, but leave a few scales here and there (they may be of interest). I prefer to flatten somewhat, to get a better view, but never to the point of real distortion. If the pelt shows any obvious features I slit it down one side and mount it spread out.

In lateral mounts (which are usually best for butterflies) I prefer to disarticulate the upper valve, so as to expose the important inner face of the other without confusion. On the other hand, in many forms (e.g., some Tortricidae and Lasiocampidae) the aedoeagus is firmly articulated and cannot be removed without smashing something.

I prefer thick balsam for thick mounts, - it shrinks less. I like to use small bits of thin microscope slide as weights. I would emphasize more that slides, even if pretty old, should not be stored on edge; if boxes are used they should be filed upright.

W.T.M. Forbes

CHANGES OF ADDRESS

Beall, Geoffrey (Dr.), Dept. of Mathematics, University of Connecticut, Storrs, Conn.
Coher, Edward I., 47 Mt. Pleasant, Amherst, Mass.
Howe, William, 344 North 30th St., Kansas City, Kan.
Tveten, John L., Kiester, Minnesota.

THE LEPIDOPTERISTS' NEWS
Official Periodical of The Lepidopterists' Society
One volume of nine numbers published per year

Membership is open to all persons interested in any aspect of the study of butterflies and moths. The 1951 dues, including subscription to the News, are $2.00 for Regular Membership and $5.00 for Sustaining Membership. All remittances should be sent to the Treasurer: Dr. J.B. Ziegler, 18 Baltusrol Place, Summit, N.J., U.S.A. The Secretary of the Society is: Dr. F.H. Rindge, American Museum of Natural History, New York 24, N.Y., U.S.A.

The Lepidopterists' News

THE LEPIDOPTERISTS' SOCIETY
c/o Osborn Zoological Laboratory, Yale University, New Haven 11, Connecticut, U.S.A.
Editor - C. L. REMINGTON • *Assoc. Editor* - J. E. REMINGTON

Volume IV 1950 Numbers 8-9

THE FIELD SEASON SUMMARY OF NORTH AMERICAN LEPIDOPTERA FOR 1950

Two notable general characteristics of the 1950 season were: 1) impressive climatic events in all regions, with opposite conditions prevailing concurrently in different areas; 2) marked absence of large-scale migrations, sharply contrasting with the great year of migrations, 1949. The Season Summary itself shows two trends: 1) comparisons with other seasons were carefully developed by many field workers, but 2) the response fell below that for 1949, probably due in part to lack of dramatic migrations.

1. MIGRATIONS

The tremendous 1949 flights of Vanessa cardui, Danaus plexippus, and Celerio lineata were lacking in 1950. Apparently all the cardui perished during the winter in Canada and New England. Some were seen in early spring in Kansas, Michigan, and Georgia. In Alabama "an exceptionally good flight" was noted, but in adjacent Mississippi cardui was not found. In New Mexico a large number were seen in November. Danaus plexippus seemed generally scarcer than usual. Several "earliest" dates for 1950 were reported: Georgia, March 29; Maryland, April 26; Michigan, June 8, Wisconsin, June 8; New York, June 6; Connecticut, June 4; Maine, June 6. The fall southward flight was reported weaker than in 1949. Libytheana bachmanii appeared by the "thousands" in northern New Mexico June 29 - July 15; it was not reported elsewhere as a possible migrant this year. A conspicuous eastward migration of Ascia monuste phileta was seen in Alabama. Among the moths, swarms of Alabama argillacea appeared in Illinois, but it was notably reduced in New York, Massachusetts, and Maine (where a flight was observed Sept.7).

2. WEATHER AND POPULATIONS

This was a year of contrasts. The 1949-50 winter in the Northwest was the most severe on record; in the Southeast it was the mildest and was generally mild in the Rocky Mts., Mid-West, and East. Almost everywhere spring Lepidoptera appeared early briefly and then were delayed by the cold, wet later spring weather. The summer was very dry on the whole West Coast, the Rocky Mts., the extreme Southeast and the extreme Northeast; it was moist in southern Arizona and western Canada and average in the Mid-West and East. The population levels of most species were reported to be very low on the whole West Coast and in the Rocky Mts. and Mid-West. In the East and Southeast, flights were in general at least average.

Arizona, except for the northern section, had an excellent year; most notable was the tremendous population of Litocala sexignata, and Euparthenos nubilis also abounded; Hesperiidae were especially numerous. The dismally poor year in the Northwest had a few bright spots: Oeneis nevadensis, apparently in a precise alternate-year schedule, was common, as were Papilio oregonia and the Catocalas; noctuids were up a bit over the poor season of 1949, and Euxoa ochrogaster was an economic pest far south of its usual pest limits. In the Rocky Mts. there were a few exceptions to the poorness of the year: Erebia callias was in great numbers and again Malacosoma larvae were in serious abundance; an unequalled number of noteworthy strays arrived from far to the southward. In the Great Plains the populations were mostly high but Sphingidae and Catocalas were scarce. The Mid-West and the Central Seaboard had an almost uniformly low year, except for the Satyridae. The Southeast had a poor year. In the Northeast, much of the area had at least an average year. Hemileuca maia had a great flight on Long Island. Around Ottawa there was a serious outbreak of Malacosoma disstria. The Datanas were in outbreak numbers in New Jersey and Connecticut. Alypia octomaculata was also a severe pest in southwestern Connecticut.

PROCEDURES IN SUMMARIZING

Certain practices are followed in most parts of the following summaries, in the interests of clarity and uniformity. 1) Subspecific names are omitted except in rare cases where certain "subspecies" are very possibly full species and confusion could ensue if the full name were not given (e.g., Limenitis arthemis astyanax). Thus, Speyeria atlantis, mentioned in California, would refer presumably to subspecies irene, not to a tired individual from New England. 2) Authors' names are omitted after species names to save space. 3) Nomenclature largely follows the McDunnough Check-lists, but in order to promote uniform usage of corrected names, several names are substituted, such as Speyeria for North American "Argynnis", Boloria for "Brenthis", Limenitis for Basilarchia, Lethe for Enodia and Satyrodes.

In this year's summaries an unusual number of individual records are published without comparisons with other years. These will be wasted, in the sense of the Summary's purpose, if future comparisons based on them are not established, but we believe it is valuable to get in print a number of such records to give future field workers a basis of comparison.

C.L. Remington

by Lloyd M. Martin
Los Angeles, California

CALIFORNIA

The reports on Lepidoptera from California were not as favorable as in the past. In the northern part of the state, the season began normally at low elevations in the middle of February, then was delayed, due to storms, snow, and frosts. As the season progressed some species were out for only a short period, others were far below the normal abundance. In the mountain areas, a killing freeze the first part of June caused a two to three weeks setback. By June 20th, species were out in fair numbers, but for only a comparatively short period.

In the southern part of the state, the rains, which are the all-important factor, were normal until late January. Then when the storms were needed the most in February and March to produce moisture for the growth of plants, it turned cold, and very little rain appeared. This caused a short spring season. We received about one-half the normal rainfall for the year and only fair collecting was experienced by most collectors.

SANTA CLARA - SANTA CRUZ - SAN MATEO COUNTY AREA. J.W. Tilden's thorough report is given in full. "The season began normally in mid-February, was then delayed by storms. Snow, heavy frost and winds in late spring caused appearance of certain species to be late, and some failed to appear in numbers enough to be noticed. Summer and fall were exceptionally dry (total rainfall for the season was far below normal) and late insects mostly scarce. Specific data follow.

Philotes sonorensis appeared in Alum Rock Park Feb. 19-24, about ten days late (normal Feb. 10). Numbers were reduced, apparently because of a fire which swept the area in 1949. Another fire swept the area in 1950, and may further reduce numbers in 1951. This is, to my knowledge, the northern limit of the species. Plebeius acmon and Colias eurytheme flew at the same time in normal numbers but also a little late. Of the moths, Epirrhoe plebeculata appeared Feb. 24, possibly early (normal about Mar.1). Most early day-flying moths were scarce, where normally common. Pieris napi appeared at the normal time but in reduced numbers.

Soon thereafter inclement weather delayed collecting and apparently had a very adverse effect on some species. Callophrys dumetorum was seen first on March 31 (normal, first week in March), and the usual large numbers of this species, extending into April, did not appear. Incisalia iroides, usually common in March and into April, did not appear in numbers, but two were taken. Pieris sisymbrii, usually present in the Alum Rock area, though not in large numbers, was not found. Anthocharis sara reakirtii and Euchloe ausonides seemed to be about normal in numbers. Proserpinus clarki was not found although two trips were made to normally good territory. Only two Hesperia columbia (always scarce) were seen, at normal season early April), but neither was taken.

At San Francisco, Glaucopsyche xerxes was not taken although three trips were made. As has been suggested, it may have become nearly extinct of late. Plebeius pheres was not taken either, but Plebeius icarioides was present in good numbers at the normal time, early April. In the San Jose area, local populations of icarioides were on the wing by April 24, about three weeks late, but in fairly good numbers.

The common late spring butterflies were somewhat reduced in numbers, including Euphydryas chalcedona, Melitaea palla, and Anthocharis sara. These insects fly over such a long period that exact dates mean little. The common blue, Lycaenopsis pseudargiolus, that usually swarms from the first warm February day until early July, was seen only now and then. On the other hand, there was a larger-than-usual spring brood of Poanes melane, appearing as usual in April and May.

The bulk of the late spring species were reduced in numbers. In this area late spring merges into early summer almost without a break, the lack of summer rain causing a drying in late May and early June that is characterized by many flowers and the appearance of many species of butterflies. This year most of these were of common sorts. A number of the choice items were either absent or few. Strymon auretorum was not seen. Strymon dryope was greatly reduced in numbers and appeared in Mocho Creek (Alameda County) and in Arroyo Bayo (Santa Clara County) the second week in June, about five weeks late (normal, early May). Strymon californica was so scarce as not to be seen, very unusual for this normally abundant species. Strymon saepium on the other hand seemed present in about usual numbers. In 1949 Hesperia juba and lindseyi appeared in the same general areas in June. None was seen in 1950. The late emergence of Glaucopsyche lygdamus seemed a little better than last year, rather strangely, since the early flight was overlooked completely by me. Melitaea leanira seemed to have a good year and rather more than usual of this infrequent species were seen.

In the Santa Cruz Mts., Speyeria callippe was out in numbers at Alma (Santa Clara County) May 30 - June 11, normal time. Speyeria coronis was nearly absent, however, but two seen. Alma, incidentally, is the type locality. Thorybes pylades was present, time normal, numbers reduced. Erynnis tristis and E. propertius were present in usual numbers; E. afranius was nearly missing. Papilio rutulus and eurymedon straggled along through the year but not in the large numbers often noted.

In the Silver Creek area of the Mt. Hamilton foothills Tharsalea arota, Minois alope, Minois silvestris, Lycaena xanthoides, Lycaena gorgon and Pieris napi, normally out about June 1, were delayed until mid-June and all were scarce except the ever-abundant xanthoides, which very seldom fails to appear in numbers. Arota was especially scarce. This may have been due to the dry weather which caused Grossularia to drop its leaves early, part of them falling in late May.

Other trips at this time were too casual to yield dependable data. A trip to Big Sur, Monterey Co., in search of Incisalia doudoroffi failed because of fog.

In Santa Cruz Co., late June usually brings at least some Speyeria adiaste, though never many. This year only one was seen, near Boulder Creek. In this region all butterflies were scarce except Precis coenia, which seemed more than usually abundant, with

FIELD SEASON SUMMARY 1. SOUTHWEST - cont.

numerous larvae on plantain. Habrodais grunus was not found. This is not too surprising since this species is rare in some years and abundant in others. It appears to go in cycles but what the length of these cycles may be is not clear yet.

Midsummer conditions were exceedingly dry and hot. Apodemia mormo appeared in Alum Rock Park in late July and early August, normal time, but in small numbers. The usually abundant summer brood of Plebeius acmon was nearly absent. Summer collecting seldom yields much here.

Fall collecting was less productive than usual. Ochlodes sylvanoides flew in large numbers from mid-July to November, as usual. But Hesperia harpalus, Erynnis tristis, Poanes melane, and Polites sabuleti were scarcer and rather more irregular in appearance than usual, straggling along rather than appearing in well-marked broods.

On the other hand, late fall was marked by open moist weather due to early rains, without frost, and up to December 10, Atalopedes campestris, Hylephila phylaeus, Vanessa carye, Colias eurytheme, and Pyrgus communis were commonly seen in yards in town (San Jose). Lawn moths (Crambus spp.) are still active (Dec. 15) and coming to porch lights.

In the Santa Cruz area, midsummer was unproductive except that Hesperia dodgei was located in fair numbers about twenty miles north of the classic locality. Careful search of the entire area from Capitola to Halfmoon Bay failed to yield other records. Numbers were taken near Waddell Creek, Santa Cruz Co., in mid-August, fresh and mostly just coming out, about three weeks later than the norm of July 17 noted at Twin Lakes in the City of Santa Cruz, the former metropolis for the species. I believe the species to be extinct on the type locality, which was vacant lots near the home of the late E.A. Dodge in the King Street section of Santa Cruz. This place is now solidly built up. The Twin Lakes colony may also be extinct, as I have found none there since 1942. Building and regular burning of vacant lots seems to have nearly or quite exterminated them. Most of this burning is done under city orders to abate weeds.

Danaus plexippus was locally scarce, and was not seen migrating in large numbers, although some passed through yards in San Jose in September. A wintering aggregation at Sant Cruz seems to have fared badly because of a fire in a grove at Swanton Beach. This matter was of sufficient interest to be written up in the Santa Cruz papers and caused subscribers to write letters of protest about the fire."

MT. LASSEN, MT. SHASTA, CASTLE LAKE AREA. At Mt. Lassen, July 27, D.L. Bauer found Gnophela latipennis, Parnassius clodius, Speyeria egleis oweni, Plebeius icarioides abundant.

Ford reported cold weather and late snows on Shasta July 4th, with Lepidoptera much delayed; Parnassius clodius, Pieris sisymbrii, Oeneis nevadensis, the early Speyerias, Callophrys dumetorum, Plebeius icarioides, and so on were just emerging. 1931 records showed the same species in that stage by mid-June. Pseudohazis eglanterina was flying July 5th near Weed. Bauer found in abundance July 28 Pieris beckerii and occidentalis, Parnassius clodius, Speyeria egleis oweni, S. hydaspe, S. callippe rupestris, Nymphalis milberti, and the Aegeriidae: Synanthedon fragariae and S. mellinipennis.

Ford likewise found the Castle Lake vicinity behind normal years. On July 17-18 P. clodius was common, P. smintheus was just emerging. O. nevadensis, Coenonympha californica, and several Speyeria were numerous; also flying were Melitaea hoffmanni and whitneyi, Polygonia zephyrus, Lycaena nivalis and mariposa, and Plebeius anna, aquilo, acmon, and icarioides. Ten days later Bauer again found P. smintheus, O. nevadensis, S. callippe (females) and others; S. atlantis dodgei and Phyciodes campestris had become the most abundant butterflies.

CENTRAL - WESTERN AREA. In late June in Mariposa Co., Tilden found extreme dryness, with Parnassius clodius common, Speyeria hydaspe, Erynnis callidus, Plebeius saepiolus, Boloria epithore, Polites sabuleti, and Annaphila spp. all rather scarce; at light nothing but a few Stamnodes appeared.

At the same time in Madera Co., Speyeria callippe was common but worn, indicating about an average flight period. Minois silvestris was also badly worn and Plebeius acmon was common.

On June 27-28, in the Greenhorn Mts., S. callippe was very worn, normal for that date; the other low altitude species (Strymon california and saepium, Tharsalea arota, Melitaea palla, Euphydryas chalcedona)were similarly worn. Higher up, Mitoura nelsoni was common and fresh; Polites sabuleti and Plebeius saepiolus were fairly common, and Speyeria hydaspe was just beginning to emerge.

In Kern Co. at the same time conditions were very dry. Colias eurytheme was abundant, with a few Ochlodes. Lycaena xanthoides was very common at Monolith, with a few L. rubidus.

At Mono Lake at the end of June Tilden found Plebeius icarioides, P. saepiolus, Strymon californica, and Callipsyche behri rather common; Polites sabuleti, P. sonora, Speyeria nevadensis, Limenitis weidemeyerii, and Melitaea acastus were scarcer. Coenonympha ampelos seemed to have been eliminated by overgrazing by sheep. One month later Bauer found all species scarce; only 2 fresh ♀♀ of Speyeria nokomis were found, where both sexes often abound. When Tilden returned in mid-August, a few S. nokomis, P. saepiolus, and Ochlodes sylvanoides were found. Conditions were bone-dry and collecting very poor. At Leavitt Meadows, he found O. sylvanoides, P. sabuleti, and Hesperia harpalus common; L. rubidus was scarce, and nothing else was seen. At Bridgeport, C. ampelos was worn; P. saepiolus, P. sonora, and Phyciodes montana were present.

Near Mt. Whitney Bauer found Plebeius aquilo and Polites sabuleti common in late July, with a few L. rubidus and Parnassius smintheus.

At Tioga Pass Tilden found conditions too cold in late June, but in mid-August Speyeria mormonia, P. saepiolus, P. sabuleti were common; Lycaena editha and mariposa were scarce; Colias behrii, often very common, was very scarce; several normal species, like Lycaena nivalis, were not found.

At Soda Springs, Nevada Co., on July 25, Bauer found L. editha, L. mariposa, L. cupreus, L. nivalis,

Satyrium fuliginosa, Plebeius anna, P. saepiolus, P. icarioides, Boloria epithore, Phyciodes campestris and montana, Melitaea hoffmanii, and Speyeria spp. in fair numbers.

Weber found Plebeius emigdionis very common and earlier than in 1949 at Victorville April 22 and 29; Pieris protodice, Euchloe creusa, and Pseudocopaeodes eunus were also common then. At Frazier Mt. Park May 13, he found Plebeius icarioides and Phaedrotes piasus common; Plebeius melissa, Anthocharis sara, and Colias harfordii were scarce. In the Greenhorn Mts. June 12, Weber found Heliopetes ericetorum, Mitoura nelsoni, Strymon saepium, S. californica, Incisalia iroides, Lycaena xanthoides common; Strymon melinus, Incisalia eryphon, Tharsalea arota, Melitaea palla (worn), Nymphalis milbertii, Speyeria hydaspe (♂♂) were scarce.

At Bartel, north of Mt. Lassen, Weber found Speyeria zerene, S. hydaspe, Boloria epithore, Melitaea palla common July 2; Mitoura johnsoni, Nymphalis californica, Oeneis nevadensis (worn) were scarce.

SOUTHEASTERN AREA. On June 20, S.S. Nicolay and L.M. Martin found Pseudocopaeodes eunus in full flight (some worn) at Olancha a week or two later than in average years. At Darwin Falls, June 19, Ochlodes yuma was out in fair numbers. At Bishop Creek (el.8,110 ft.), June 20, Euphydryas olancha, Melitaea acastus, Phyciodes campestris, Plebeius icarioides, Hesperia idaho, H. juba, Thorybes nevada were found, but no moths came to light; a freeze in early June had killed many insects here; the season was perhaps two weeks late.

LOS ANGELES - RIVERSIDE AREA. Although this is the region most heavily populated by lepidopterists, the reporting was extremely disappointing. The lone summary came from Weber; fortunately it is extensive and detailed.

At Little Rock it was cold and wet for the first three weeks of Jan. On Jan.1st a few diurnal moths were flying; many Megathymus yuccae larvae were found in Joshua Trees. Again at Palmdale, Feb.22, the diurnal moths were found, as well as a few fresh Pieris beckerii (normal date). By Mar.19, in the Gavilan Hills (Perris), Plebeius acmon, Mitoura loki, Apodemia mormo, Euphydryas chalcedona, Melitaea gabbi, Pieris protodice, and Colias eurytheme were common. Callophrys dumetorum (worn) and Anthocharis cethura (♂♂) were scarce and Euphydryas editha was uncommon and local. Conditions were about average for this date.

In the Providence Mts. Dr. Hulbirt had found Callophrys comstocki and Incisalia fotis in good condition in early April. By the 14th both were very worn, as were Euphydryas hermosa and Mitoura siva. Chlosyne californica, Melitaea neumoegeni, M. alma were fairly common.

April 22 and 29, Plebeius emigdionis and Pseudocopaeodes eunus were found common along the Mojave River at Victorville, San Bernardino Co. Pieris protodice and Euchloe creusa were not as common as in the past years. This is about the normal time of year for these species to appear in this area.

In the Phelan area, April 22 and 29, Melitaea wrightii and leanira were found in numbers in good condition along the hillsides. Melitaea neumoegeni just coming out but in good condition. Philotes speciosa was rare with only one being taken; this species is found more commonly further out on the desert in the Kramer Hills. Plebeius icarioides was not as common as in past seasons but still in good numbers. Glaucopsyche lygdamus and Callophrys dumetorum were in poor condition. Mitoura siva were fairly abundant in the Juniper trees but in poor condition, probably normal for this date.

In Beverly Glenn Canyon, Los Angeles Co., on May 7 and 10, Vanessa atalanta, Melitaea gabbi, Anthocharis sara, and Coenonympha californica were out as normal. Calephelis nemesis is occasionally found here, one specimen being taken at this time.

In Sespe Canyon, Ventura Co., on May 13, A. sara and Colias eurytheme were out as usual with C. harfordii and Papilio rutulus. Season about normal for appearance but subnormal for numbers.

In the Bouquet Canyon area of Los Angeles Co. the season was about normal in spite of the lack of rain. Speyeria callippe, Plebeius acmon, P. monticola, P. rutulus, M. gabbi, Incisalia iriodes, Hesperia lindseyi and Heliopetes ericetorum were found quite common on May 20.

On Sept.9, the second brood of Apodemia mormo was common on the Angeles Crest Highway in Los Angeles Co. Normally this second brood is not as heavy as the earlier emergence in April and May.

SAN DIEGO AREA (Thorne and Creelman). For the second winter in a row, January brought freezing temperatures to all but the most favored spots, but with little injury to Lepidoptera. The spring season actually was somewhat early with Incisalia iroides appearing on February 18 at El Cajon and Euphydryas editha starting to emerge February 21 at Otay. Spring flights of all butterflies were light and continued so throughout the year due to drought. The desert areas were particularly poor, although a few species such as the desert race of Euphydryas chalcedona appeared in good numbers for a short time (Mar. 31, Box Canyon). Curiously enough, larvae of this race starved to death on the preferred food plant of the parent species here, Scrophularia californica. Caterpillars generally were hard to find all year long.

On April 15 at Desert Springs, Los Angeles Co., Apodemia mormo was abundant and Melitaea neumoegeni and M. leanira in good numbers on the few flowers present. Here again it was a restricted nectar supply rather than abundance of butterflies.

A sharp late frost in the mountain areas around May 1 contributed to light flights there, although around what few moist spots there were in mid-June Speyeria coronis, Adelpha bredowii, and other species were fairly numerous due to restricted water sources. The Palomar Mountains were poor in July but a few Pyrgus xanthus were there. Speyeria callippe appeared normally about May 21; it seems to survive drought better due to the ability of the particular violet it favors to withstand dry years.

It was a disastrous year for forest fires; one fire in August burned over 100 square miles of brush and timber including some of the heaviest stands of trees in the Cuyamaca Mountains.

There was no fall flight of double brooded species noted in desert areas, and even the skippers which seem to do better in dry years were below nor-

FIELD SEASON SUMMARY 1. SOUTHWEST - cont.

mal. Wittman found collecting poor in Borrego Valley and saw no Chlosyne lacinia. This species was plentiful at Bard and in the Imperial Valley on September 1, and when the temperature was 123° F. the larvae still persisted in a habit, which proved fatal, of dropping to the ground when the sunflower leaves were disturbed.

Calephelis wrightii was found near Lakeside where its food plant, Bebbea juncea, occurs. This is the first record of this desert species in coastal areas.

In early August the Santa Cruz mountains were practically devoid of butterflies. It was apparent that drought conditions prevailed there.

While no doubt there was some migratory movement in San Diego County, the low population levels made it difficult to observe. Vanessa cardui and Danaus plexippus were both below normal.

Currently, at year's end, the weather has been unusually warm and summer species continue in normal flight. All stages of Agraulis vanillae were still around in late December.

Weber found Speyeria callippe and Lycaena hermes abundant at Barber Mt., June 25. At Mason Valley, on Sept.24 ("normal" date), he found Megathymus stephensi common; at Vallecito the second brood of Melitaea chara, Apodemia marginalis, and Hemiargus gyas had appeared.

NEVADA

At Mt. Rose, July 1, Weber found Nymphalis antiopa, Plebeius saepiolus, P. aquilo, Strymon californica common. Pieris sisymbrii and Incisalia eryphon were scarce, and Speyeria callippe rare and very worn.

On July 26, on the Nevada side of Lake Tahoe, Bauer found Plebeius aquilo and Thorybes nevada very common. Other species collected were Speyeria mormonia and "montivaga", Euphydryas nubigena, Phyciodes montana, Nymphalis milberti, Incisalia eryphon, Satyrium fuliginosa, several spp. of Lycaena and Plebeius, Hesperia idaho, Polites sabuleti, and P. sonora.

At Mt. Charleston, near Las Vegas, Weber found Speyeria coronis common (♂♂ worn, ♀♀ fresh), Minois alope and Plebeius icarioides common but worn, and Neophasia menapia scarce, on July 28.

ARIZONA

Bauer's very detailed report for Arizona follows essentially in full.

Collecting began Feb.26th, at Yarnell Hill in the Weaver Mts., Yavapai Co. The day was cloudy and not many specimens were taken, aside from about 30 Hemileuca electra larvae, Anthocharis pima and Plebeius acmon. During the following few days a little collecting was done in the Yuma area. Around Yuma only Pieris protodice were seen and an hour spent collecting moths at light gave no results. On the return trip from Yuma collecting was again done in Congress Junction, Chlosyne californica and Plebeius acmon were taken, while Yarnell Hill yielded Anthocharis sara, Pieris sisymbrii and Lycaenopsis pseudargiolus.

March 13 a little collecting was done in the mountains around Prescott with about the same species flying, but in addition, Incisalia iroides and the moth Litocala sexignata were first encountered.

COTTONWOOD REGION. The weather for the Cottonwood area can be summed up as follows: Cold weather came early last fall with a heavy frost and snow on the mountains the first few days of October. The early cold weather brought with it considerable rainfall, so that from October through December it was definitely on the wet side. The rains slacked up the last of December and by the end of January nearly all of the winter rain had fallen. One storm did bring a little rain the last of February, but from the February storm to the middle of July there was practically no rainfall. The spring and early summer were cooler than normal with a frost as late as June 7. The summer was not hot -- just about average, with heavy rains during the last of July and early August, which made the entire countryside, and even the desert, green. The thunderstorms continued through August and into September. In middle September the thunderstorms stopped and only a few light showers were received from mid-September until November 9, when a cold front from the north brought 50-miles-an-hour winds and dropped temperatures to as low as 15-20 degrees (Fahrenheit) in the valleys and as low as 5° above down to zero in the mountains, thus bringing the collecting season to an end. The cold wave of Nov.9 brought low temperatures but no rainfall or snow; not even San Francisco Peaks received snow.

The above summary of the weather also applies to nearly all of Arizona. The rainfall followed a peculiar pattern this last year, which could be summed up as follows: The southern part of the state received about average rainfall, the central part above average rainfall, and the northern part well below average. Most of the summer storms did not produce rain north of the Mogollon Rim.

Collecting began in the Verde Valley the first of March, with a number of species flying by the thousands. One species is deserving of particular mention, Litocala sexignata, which appeared during March by the millions. In fact, there were so many L. sexignata flying around damp ground along the streams and the flowering shrubs that it was rather difficult to collect other less common species. I have never encountered so many of any one species except possibly Vanessa cardui in the spring of 1949 on the desert of southwestern Arizona and southeastern California. L. sexignata did not seem to migrate but were just flying in every direction, and being a day flier it would have been easy to ascertain if they had been migrating in one particular direction. I encountered them first in numbers on what is called Yarnell Hill in the Weaver Mountains, Yavapai Co., on March 2, and by the middle of March they were flying at their peak in the Verde Valley and lower slopes of the mountains. At higher elevations they remained on the wing well into April. Then they disappeared and none were seen until about the end of September, when a few were observed at about 5,000 ft. elevation on Mt. Mingus.

This was my first full collecting season in the Verde Valley area so I cannot compare this past season with former years, but it seemed that there were a great many spring species that were very abundant. Among the butterflies the following species were found in great numbers: Anthocharis sara, a species of Melitaea, the exact species or race not yet determined but belonging to the gabbii-acastus-neumoegeni complex. Incisalia iroides was also very abundant, being second only to L. sexignata. It was particularly abundant along lower Oak Creek. Other species that were flying in considerable numbers were: Pieris sisymbrii, Celotes nessus, Lycaenopsis pseudargiolus, Zestusa dorus, Thorybes pylades, Pholisora mejicanus and P. ceos, Erynnis lacustra and E. horatius.

Other species that were present but not in the number of those mentioned above were as follows: Papilio ajax appeared in fair numbers in the spring and then a few were seen throughout the summer and as late as the end of September, but were not as numerous during the summer and fall as a year ago. Papilio daunus was also less common during the summer and fall than a year ago, and Papilio philenor followed the same pattern. Pieris protodice was one of the first to appear in the spring and continued in fair numbers until the cold wave in November, as did also Eurema nicippe, although E. nicippe was considerably more abundant than P. protodice. P. sisymbrii, as noted above, was abundant only in the spring while P. rapae, although more numerous in the spring and early summer, also flew late in the fall (November). Eurema mexicana flew in the early summer and a few in the fall. As stated above, Anthocharis sara was very common last spring over most of the central mountainous part of the state. And Euchloe creusa was found in fair numbers at between 4,000 and 5,000 ft. on Mingus Mountain.

The first Satyridae to appear in the Verde Valley area was Neonympha dorothea, which was first observed about the last of May at about 4,000 ft. elevation at the base of Mingus Mountain. No other Satyridae were observed until the 1st of September, when Neonympha dorothea became abundant at 5,000 ft. elevation, along with Minois meadii and Gyrocheilus patrobas. The September Satyridae flight continued throughout most of the month and N. dorothea was still on the wing in October, though in damaged condition.

Danaidae were not very plentiful, particularly D. plexippus. A few were seen throughout the entire collecting season. D. berenice was much more common, although the fall brood was considerably less than a year ago. Nearly all Danaidae had disappeared from the Verde Valley area by the 1st of November.

Nymphalidae were off to a good start in the spring, but most of the species showed a decrease in numbers during the summer and fall. Polygonia satyrus was fairly common in the spring as were other overwintering species such as Nymphalis antiopa, and Anaea andria. Vanessa cardui did not make a very good showing; during most of the year more specimens were seen after the first cold snap than during the rest of the season. The rest of the Vanessas were also not well represented. All three species of Limenitis were in about their usual numbers. Euphydryas were much below the numbers of a few years ago, as were also Melitaea fulvia, M. pola, but the Melitaea of the gabbii-acastus group were abundant during most of March. Late in September two specimens of M. theona were encountered at about 5,000 ft. on Mingus Mountain. The Phyciodes species were about the same as numbers went. Euptoieta claudia made a good showing in the spring and early summer but fizzled out in late summer and autumn. Asterocampa leilia made a very poor showing in spring and early summer, showed a definite increase in late summer and were out in good numbers by September. Adelpha bredowii was out in good numbers most of the year, although down a little from previous years. The Chlosyne got off to a good start and continued to increase until mid-October. No Junonia were seen this season. Libytheana bachmanii made a very poor showing this past season with only a few specimens being observed now and then throughout the year. Riodinidae were present in their favored months in good numbers. For the first time Apodemia mormo was found down in the floor of the valley. In October Calephelis nemesis was taken for the first time at the southern end of the valley near Camp Verde.

Lycaenidae did not in general make too good a showing this past year, the single exception being Incisalia iroides which appeared in untold thousands during March. Of the remaining 14 species the following are the only ones that appeared in fair numbers: Leptotes marina, Brephidium exilis, Plebeius acmon, and L. pseudargiolus.

Several species of Hesperiidae made a wonderful showing in the spring. Among them were Zestusa dorus (early summer), Heliopetes ericetorum, Celotes nessus (spring), Pholisora ceos and mejicanus (spring), Erynnis lacustra and horatius (spring), E. juvenalis (early summer), Hesperia woodgatei (Sept.). Most other Hesperiidae were out in good numbers, but all species were absent or much reduced in numbers in late summer and fall except for Pyrgus communis, Copaeodes aurantiaca, and the following species which were not seen in the spring and seem to be summer and fall species; H. ericetorum more abundant in Sept. than in spring, Erynnis pacuvius taken only in Aug., H. woodgatei taken only in Aug., Sept., and Oct. Other species that seem to be only summer and fall species are Hylephila phylaeus, Atalopedes campestris, and Lerodea eufala.

Megathymidae made very good to fair showings this past season. M. yuccae was out in fair numbers in March and April. M. polingi made a fair showing in September, although less than last year, and M. neumoegeni was out in usual abundance in early Oct.

Moths had a fairly good season with of course Litocala sexignata heading the list for abundance. About thirty Automeris pamina emerged from the cocoons of larvae collected last fall. The A. pamina larvae took a nose dive in numbers this year, only one larva being found where last fall forty or fifty were collected. During July and August moth collecting was good, with many species being taken, but most of them are still unidentified. Among those taken were Dictyosoma elsa, and of course Celerio lineata and Phlegethontius sexta and quinquemaculata. Adelocephala heiligbrodti was flying during most of the season but its peak was the first of August. One male was taken as late as November 5. Among the Arctiidae the only species taken in the Verde Valley were a species of Crambidia and one of Cisthene, both as yet undetermined, and Pygarctia murina. No

FIELD SEASON SUMMARY 1. SOUTHWEST - concl.

Hyphantria cunea this season, but their webs on the trees showed definite decrease in numbers over last year.

Many spp. of Phalaenidae were taken. Among those identified are: Feltia annexa, Peridroma margaritosa, Trichoclea antica, Rancora serraticornis, Cyathissa percara, Stiria rugifrons, Basilodes pepita, Copidryas gloveri, Annaphila astrologa, Heliothis phloxiphaga, Schinia ciliata, Schinia sexplagiata, Grotella binda, Tarachidia candefacta, Acontia expolita, A. areli, A. lanceolata, Antaplaga dimidiata, Autographa brassicae, Catocala arizonae, and Heteranassa minor and a few others.

Of the Geometroidea the Semiothisa were the only ones that made a good showing.

Rather heavy rains fell during the last of July and 1st of Aug. over the entire southern and central portion of the state, resulting in good collecting during late Aug. and Sept. However, the northern and particularly the northeastern part of the state had little or no summer rains. 1950 was one of the driest years ever experienced in the northern section. Consequently, collecting was very poor there.

In the Upper Oak Creek and Flagstaff area collecting began about April 1. Euphydryas hermosa was not as numerous as in former years but the Melitaea of the gabbii-acastus group was abundant in Upper Oak Creek. Other spp. taken were Anthocharis sara, Glaucopsyche lygdamus, Incisalia iroides, several spp. of Erynnis, and the moth Leptarctia californiae.

During June collecting in the Flagstaff area hit its peak. Typical June species of the upper Oak Creek-Flagstaff area were Papilio rutulus, Colias alexandra, Speyeria atlantis, Melitaea pola, Polygonia satyrus which seemed to be exceptionally numerous, Limenitis weidemeyerii and Plebeius icariodes. In the Fry Canyon area the moth Euparthenos nubilis was very abundant flying about in daylight and there were literally dozens of them in the water holes.

The higher elevations of San Francisco Peaks yielded the usual species, Pieris occidentalis, Oeneis daura, Plebeius aquilo, Glaucopsyche lygdamus, and others.

In mid-June in the Grand Canyon area conditions were rather dry but several exceptional spp. were taken, among them Papilio bairdii, Coenonympha furcae, and Megathymus streckeri. Other species taken were the same as for the Flagstaff area.

On April 1 the spp. taken in the canyons of the Hualapai Mountains, near Kingman, were about the same as for Mingus Mountain, but Megathymus yuccae was much commoner, as were G. lygdamus and Pieris sisymbrii. In the desert canyons right around Kingman Melitaea neumoegeni was about the only sp. seen. A very interesting situation, and a fruitful opportunity for breeding experiments, was found in the lower canyons of the Hualapai Mts., where Melitaea neumoegeni was flying in company with the Melitaea of gabbii-acastus group mentioned above, and where typical specimens of both spp. were taken, but the larger part of the specimens taken showed definite signs of intergradation, which would lead one to conclude that the 2 forms hybridize where their ranges overlap. Specimens taken in the Cottonwood area showed no tendencies toward M. neumoegeni, and specimens from lower elevations around Kingman showed little tendency toward the typical Cottonwood form.

Conditions were also dry at the Rainbow Bridge National Monument on the Utah-Ariz. border and Navajo Mountain, Sept.1, and very few butterflies were seen. Melitaea pola was on the higher mesas, and in Rainbow Canyon Apodemia mormo, Philotes glaucon, Hesperia woodgatei, and the rare Ochlodes yuma, were taken. A little collecting was done in the Wickenberg-Congress Junction area near Phoenix on Oct. 1. The desert was dry and the only spp. taken were Apodemia palmerii and Hemileuca electra.

Nicolay and Martin found the Baboquavari Mts. very dry the first week in May, but collecting was good. 26 spp. of skippers alone were taken in 3 days; a number of other butterflies were taken in fair numbers. The most interesting was a lone male Strymon jada; this I believe to be a good record for Arizona. It was too late in the season for Heliopetes laviana, 4 specimens being taken, all poor. Moth collecting was very poor, only a few coming to light. A specimen of Oospila lesteraria was the prize of the moths. That season is the poorest for most moths, whereas it is a very good time for skippers and some of the larger butterflies.

Weber found the season a little early on May 29 in the Kaibab National Forest. Plebeius melissa, P. aquilo, and Erynnis icelus were quite common. Phaedrotes piasus was not too common (a new locality for this group).

Thorne reports a tremendous flight of Lepidoptera the last week in Aug. in the Santa Rita Mts. Melitaea dymas and perse, Asterocampa leilia, Eurema mexicana, Libytheana bachmanii and Euptoieta claudia were some of the predominant spp. No real rarities were taken. Rainfall in July was far above normal in southwest Arizona, resulting in very fine collecting.

Freeman and Daly made an expedition to Arizona Sept.7-12, primarily for Megathymus larvae and adults. In Madera Canyon (Sept.8) the common spp.were Papilio philenor, Gyrocheilus patrobas, Neonympha henshawi, Melitaea ulrica, Apodemia palmerii, Strymon clytie and leda, Urbanus dorantes, Erynnis funeralis, Pholisora ceos; at the entrance to the canyon, larvae of Megathymus neumoegeni abounded in agave. In Sabino Canyon, the next day, they found P. philenor, A. palmerii, S. clytie, and Calephelis nemesis common. In the Baboquivari Mts. (Sept.9), the abundant spp. were Asterocampa celtis, Eurema mexicana and proterpia, A. palmerii (and 5 A. mormo), S. clytie and leda, Pyrgus communis (and 5 P. domicella), E. funeralis, Pholisora catullus and ceos; Pyrgus philetas and Antigonus evansi were rare. At Redington and the Santa Catalina Mts. (Sept.10) the common species were A. palmerii and mormo, S. clytie and leda; of M. neumoegeni one ♂ and several larvae were taken. At Nogales the next day M. ulrica, S. clytie and leda, U. dorantes, and E. funeralis were abundant; all these but ulrica were also common at Patagonia, where Amblyscirtes nysa and eos and P. domicella were rare. In Ramsey Canyon (Sept. 11-12) they found P. philenor, Adelpha bredowii, N. henshawi, G. patrobas, U. dorantes, and Megathymus evansi and neumoegeni common; a single male Neophasia terlooti was taken there.

Contributors: D.H. Bauer; J.L. Creelman; H. Daly; R.J. Ford; H.A. Freeman; S.S. Nicolay; F.T. Thorne; J.W. Tilden; B.H. Weber.

by John C. Hopfinger
Brewster, Washington

OREGON

Prof. Macy reported that the season in western Oregon was preceded by one of the coldest winters on record, with temperatures well below zero at Portland and lots of snow, which lasted about a month. There was heavy rainfall into June, but the summer was dry and there were almost no clouds in July - Sept. and no rain.

He found Papilio rutulus less abundant around Portland than during 1949. Parnassius clodius was also less abundant, and fewer Anthocharis sara were seen and it was more difficult to find the eggs on Arabis. He saw no Colias eurytheme in the Willamette Valley. Coenonympha ampelos was present in moderate numbers, little below 1949. Vanessa cardui, so common in 1949, was rare; V. atalanta, usually rare, was abundant and numerous larvae were found. He saw no Danaus plexippus and found no larvae on milkweed. No Nymphalis californica were seen. Papilio zelicaon was not seen, but 3 larvae were found on anise.

Weber, collecting at Mt. Hood July 3, found Speyeria coronis common and fresh (only 1 ♀), S. zerene scarce, Boloria epithore common and fresh, Papilio rutulus in fair numbers, Oeneis nevadensis common and worn, Strymon melinus and Incisalia eryphon rare, Plebeius anna common and fresh, and Glaucopsyche lygdamus ♂♂ fresh and not common.

Cook reported larvae of Euxoa ochrogaster unusually far south in pest numbers, in north-central Oregon.

IDAHO

As has been the case for several years, Mr. J.R. Douglass operated a light trap at the U.S. Entomological Laboratory at Twin Falls, Idaho, and sent Dr. Cook the Noctuid material. Collecting was very poor, only about half as many Noctuids having been captured as in 1949. Only one species, Euxoa ochrogaster, was more abundant in 1950 than in 1949, and this was correlated with its outbreak in that area. Of the more abundant species, eight were as abundant as in 1949, but were at low levels in both years, while 24 abundant species were recorded as not being as abundant in 1950 as in 1949. The decline was general and seemed to affect all groups of Noctuids, so no definite conclusions may be drawn as to the effects of conditions on particular groups.

At Geneva, July 24, Weber found Minois oetus, Lycaena rubidus and heteronea, Coenonympha ochracea, Euphydryas hutchinsi, Parnassius smintheus, and Speyeria atlantis and zerene common and rather fresh; a worn Callophrys dumetorum was taken.

WASHINGTON

EASTERN AREA. At Orcas Island (Puget Sound), Macy found Nymphalis milberti, Speyeria zerene, Oeneis nevadensis, Papilio rutulus and P. eurymedon fresh and in fair numbers in late June and early July. Not one Limenitis lorquini or Vanessa atalanta was seen; in August of 1928 he saw hundreds of both. No Nymphalis californica were seen.

On July 4 Weber found Parnassius clodius very common near Mt. Rainier Nat. Park.

WALLA WALLA AREA. Dr. Cook's report follows in full.

Following the coldest winter on record, the spring was slow and the summer cool. The first eight months of the year were all below normal in temperature. Rainfall was above normal except in May. Noctuid collecting was very poor. Only the light trap at the wireworm laboratory was operated, and no miscellaneous collecting was done.

Several common species, including Euxoa sponsa, E. messoria, E. septentrionalis, A. vetusta, Feltia ducens, G. c-nigrum, and Leucania farcta increased considerably over 1949, but in general were below normal in abundance. Scotogramma trifolii, Septis arctica, Crymodes devastator and Platyperigea extima were far below their usual abundance, as were all of the common Autographas. Heliothis obsoleta, which was so reduced by the winter of 1948-9 that no damage at all was seen until late in the fall of 1949, staged a partial comeback. Late corn was heavily attacked by the earworm unless dusted. Euxoa ochrogaster is a species of northern distribution, being of economic importance in the Prairie Provinces of Canada, and in Montana and North Dakota. It generally occurs in Washington, but is rarely abundant. During 1950, the writer saw larvae of this species which were found in economic numbers in the Yakima Valley, around Walla Walla, in north-central Oregon, and in the Twin Falls area of southern Idaho. This represents a large temporary extension of the economic range of this species. Ceramica picta, which always occurs here, was found attacking lettuce in the fall.

NORTH-CENTRAL AREA (Hopfinger). The winter '49-'50 will long be remembered as the coldest recorded in many years. The ground was bare for a week in the first part of January, with below zero temperature every day. The extreme cold lasted well into February, with about a foot of snow on the lower levels. Snow lasted well into March. Very few butterflies showed up in the spring, and few specimens were taken. Euchloe creusa, usually fairly common in April, was absent, as well as E. ausonides. Anthocharis sara was found sparingly, together with Pieris sisymbrii and beckeri. During May, some of the Lycaenidae began showing up, but nothing like the numbers taken in previous years. Most Papilio continued scarce as in previous years, and not over a dozen were seen. Speyeria also were very scarce. Oeneis nevadensis, true to its two-year cycle, showed up very well. Polygonia was nearly totally absent. In some 500 miles of collecting trips, not over a hundred specimens were taken. The one bright spot in this year was the best flight of Papilio oregonia we have had here in the last ten years. In the flower garden at my house, from one to a dozen could be seen at any suitable time. The heavy flight contin-

FIELD SEASON SUMMARY 2. NORTHWEST - concl.

ued from the first part of August well into September, and the specimens were in very good shape. Moths were scarce during the whole season. The one exception proved to be Catocalae, which were fairly plentiful and late in September could be seen flying in the daytime. All in all, I would call this the poorest season we have had here in some 40 years' collecting.

BRITISH COLUMBIA

VANCOUVER ISLAND. A model summary report was prepared by Mr. Guppy, presented in full as follows.

Weather.- The '49-'50 winter was the second in succession in which unusually severe weather was experienced. It was colder than '48-'49, in fact the coldest since local weather records were first kept, a matter of about 40 years. It should be noted though, that the snow was deep enough to prevent the ground from freezing. Insects wintering in, or on, the soil may not have been affected. The spring was late and cool, but by June things were normal. The three summer months were very favorable. Above-normal rainfall, recorded by weather stations, mostly came in heavy downpours over short periods. There were more fine sunny days than usual.

Population Changes.- Papilio rutulus and eurymedon were much reduced in numbers from the two previous years. Also their appearance was very late, early June instead of mid-May. P. zelicaon was not quite as scarce as usual. The long period over which this species was on the wing is very remarkable. First seen May 23, last September 15. Other individuals were seen all through this period. Parnassius clodius remained very abundant for the second successive year. Neophasia menapia, which in '48 and '49 had been coming back after complete disappearance, seems to have stopped at a level much below its one-time abundance. Minois alope appeared less common than usual. Oeneis nevadensis showed a very remarkable increase. Speyeria hydaspe, usually rather scarce at sea-level, became very common. Specimens were seen earlier than usual. S. zerene, usually the commoner of the two, had almost disappeared; only 3-4 specimens were seen. Boloria epithore appeared slightly more abundant than formerly. Polygonia faunus was seen more often than usual at sea-level, where I have the most opportunities for observation. This is a very good example of the way in which records of butterfly population might be misleading. I had found P. faunus very abundant on the lower slopes of Mt. Benson when I collected there in June 1949. Both then and during the spring of 1950 I visited the same area and found very few specimens present. P. oreas has definitely fallen in numbers. Nymphalis antiopa showed some increase; it has usually been very scarce here; specimens were seen in both spring and fall. Vanessa cardui disappeared entirely. Apparently none of the offspring from the large migration of 1949 survived the winter and there was no fresh influx. Strymon melinus was much more abundant than usual, both spring and summer broods. No Saturniidae were seen. Smerinthus cerisyi was less common than last year. Hemaris diffinis was fairly abundant again after several poor years. Both species of Celerio were again absent. Arctia caja failed to appear. Halisidota argentata seemed to have died out; it was very common up to 1948. Other common Arctiidae were less abundant than in previous years. Perhaps worth recording is the rearing of three specimens of Aemilia roseata. I have found one or two larvae each year, for some years, but always failed to secure adults. In Oct. 1950, while cycling between Wellington and Nanoose, a distance of about 7 miles, I picked up 9 larvae crossing the road, fairly evenly spaced along the distance. All my larvae cocooned, but some were parasitized; only 3 adults emerged. Several Orthosia sp. were taken. I had taken only one in several years. A marked decrease in Geometridae was noted.

Weber encountered rain all across B.C., but on July 10 at Princeton, he found: Speyeria zerene (1♀), Minois oetus, Pieris occidentalis common and fresh; Speyeria callippe and Coenonympha inornata common but worn. The next day, near Boat Encampment, Limenitis arthemis, and Papilio glaucus were common. At Yoho National Park July 13, Plebeius melissa was common in colonies, Erebia epipsodea common but ragged, and Speyeria atlantis present but scarce.

Contributors: W.C.Cook; R.Guppy; R.H.Macy; B.H.Weber.

3. ROCKY MOUNTAINS - NEW MEXICO, UTAH, TO ALBERTA

by Donald Eff
Boulder, Colorado

As I begin the task of attempting to set down on paper the consensus of opinion of the various collectors in this area, it occurs to me that if the Lepidoptera of this area continue the trend of the past two or three years, it will greatly simplify this report. All I'd have to do is to send in a blank sheet of paper. However, coverage of conditions for the season just past was not equal to that of the previous year. By this I mean that the resident collectors, for one reason or another, were not as active afield as they have been in the past. There is only one report by a non-resident, but that an excellent one by B.H.Weber of Burbank, Calif., who made a trip up the western coast to B.C. and then inland to Banff, Alta., and home via Waterton Lake, Montana, Wyoming, Idaho, Utah, and Nevada.

In Colorado and New Mexico there was very, very little snow during the winter of '49-'50, and the weather was of a mild nature for a mountainous area. The first entry in my Colorado collecting diary shows the date of Feb.26, when the various hiberna-

tors were flying, including a couple of Anaea andria. The first collecting usually begins with the turning of the calendar to April, but opened about a week sooner than that here. Callophrys sheridani showed up in greater numbers in this early spell, but Incisalia schryveri faded completely; only a couple specimens were observed. Aside from this one brief early flurry, our spring seems to have coincided entirely with the balance of the area in that the appearance of the usual spring species was two to three weeks late. As pointed out by Brown, it was just too dry for things to get going. Up in Alberta they experienced a bitter cold spell during the entire months of January and February when the thermometer never got above zero (Fahrenheit) and often dropped to 40° below. This may have been the cause for the tardiness of the season there. Here a heavy, wet snow on May 25, followed by freezing temperatures, caused a considerable decline in species that had been flying before that date. June was reported as not very good, the scarcity of even the most common things being plainly noticeable. July weather in Colorado, and as a whole in most of the mountainous states, follows a fairly definite pattern. The mornings are usually clear, with the afternoons becoming cloudy, and with occasional scattered showers over the mountains, but such was not the case this year! There was a total of only 3 good collecting days during the entire month, and probably not more than a dozen days when even a couple hours of poor or fair collecting could be engaged in. This was not true of the whole state, but it certainly seemed to be true of the eastern slope, where the weather showed an ever-threatening mood, but failed completely to materialize into the sorely needed rainfall. Following the extremely mild winter with this lack of moisture, and the rapid disappearance of what little snow there was in the high country, there soon existed in the alpine country an arid condition unmatched in the memories of the old-timers. It is safe to say that at least three-fourths of the little mountain streams were bone-dry this year, with the consequent diminishing of the necessary foliage. Some rains in September and early snow, especially in the higher mountains, has brightened the prospects as far as moisture is concerned for next year, but the outlook with regard to the insect population,as the result of the past summer's dryness, isn't healthy.

Of first and most notable importance when comparing this season with previous ones, is the fact that the swarms of Vanessa cardui and Celerio lineata that appeared last year were lacking in the summer of 1950. Also there was a decided scarcity of a good number of the commoner species, for one reason or another. On the other hand, the various reports show an unusual number of captures of stragglers, and reappearance of species missing for as long as ten years.

In ALBERTA Bowman, the only resident collector, noting the aforementioned bitter cold spell, the scarcity of the common species, and the occurrence mostly in singles of the scarcer species, especially the Noctuids, could only class the year as very poor. However, Weber, rained on most of the time he was in the Canadian Rockies, finally got in some collecting at the Waterton Lake National Park and found some species quite plentiful. Of particular note as common were Speyeria atlantis, S. zerene, S. hydaspe, S. cybele, Parnassius smintheus and Coenonympha inornata. Boloria selene (= myrina) were common in one spot and Oeneis chryxus also was fairly plentiful. Most of the other species, such as Colias christina, Limenitis arthemis, and Everes comyntas, were few in number.

From MONTANA, Weber's is the only report. Here he collected just below Glacier National Park and again at Monarch and White Sulphur Springs. Collecting conditions at the first two spots did not permit much observation, but he did find Melitaea palla common. However, at White Sulphur Springs he found Plebeius icarioides and melissa, Parnassius smintheus, Lycaena helloides, Coenonympha haydeni, and Minois oetus all fairly common on an open hillside covered with sagebrush and the usual accompanying semi-desert vegetation; two fresh Satyrium fuliginosa were taken.

In WYOMING there are reports from Downey of Sheridan and Glasgow of Daniel, plus the report of Weber on Jackson Hole Nat. Monument and Afton. Glasgow, at Daniel in the western part of the state, is near Pinedale, the town that is properly known as the "icebox of the nation". He reported that collecting did not even start until mid-June. No species was abundant, although he took more specimens than last year. For the first time in 10 years he saw some Parnassius. He found an Apantesis larva crawling around at 18° (F.) below zero March 30; it later pupated and hatched. Downey's collecting was interrupted in late June by a broken wrist but he got in some moth collecting and notes that the Catocalae were in good numbers, at least for a western state. At Jackson Hole, July 22-23, Weber found the best collecting of his entire trip. On Signal Mt. Speyeria egleis was common, as was mormonia; several of the Blues were in good numbers, including melissa, icarioides, and heteronea; also Melitaea palla and Minois oetus, and Coenonympha haydeni; Satyrium fuliginosa was fresh and common in one spot. At Afton, in the sagebrush, near the river, he found Lycaena heteronea and helloides common, as well as Plebeius icarioides and Minois oetus. Near Moran, C. haydeni was extremely common and fresh (both sexes), Parnassius clodius and Boloria kriemhild common and worn.

In UTAH, we are again indebted to Weber for the only report. While collecting in Zion and Bryce Parks and the north rim of the Grand Canyon,May 30, he found Plebeius saepiolus and Phyciodes mylitta abundant, Heliopetes ericetorum in fair numbers, and Colias alexandra just emerging. In Salt Lake City the end of July, the commonest species were Speyeria zerene, Lycaena heteronea, Pieris napi, and Poanes taxiles. Speyeria egleis, Hypaurotis chrysalus, Callipsyche behrii and Strymon saepium were scarce. At Cedar Breaks Nat. Monument he found P. napi,and Speyeria atlantis fairly common.

In COLORADO, we have reports from Minor on the western slope of the mountains, Renk, Schryver, Brown, and Eff on the eastern slope, and a note from Rotger, at present in Durango, but formerly in

FIELD SEASON SUMMARY 3. ROCKY MTS. - cont.

Capulin. Minor also notes the scarcity of V. cardui and C. lineata. Schryver states that Parnassius, Speyeria and Papilio seemed quite scarce. The only thing he found in good numbers was Erebia callias, of which he took over 80 above Berthoud Pass. Renk, the only one to do much collecting locally, reiterates the bad weather conditions and the poor collecting. Approximately one-half of his summer's captures consisted of Pieris and Colias. The collecting of Brown and myself was interrupted with trips East, his in April, May, and August, and mine in June. However, Brown notes the early appearance of the hibernators also, and the fact that the winter and spring were so dry that the regular season could not seem to get started. His first captures show the date of April 21 for Pieris rapae and Strymon melinus, both about 3 weeks late. Collecting was not good until the latter part of June, and from then on only fair. The results of his collecting also showed more than the ordinary amount of stragglers. These will be recounted in a subsequent paragrah. The only good collecting I found this summer was on a trip to Gore Pass, north and west of Kremmling, in Grand County. Weather on the eastern side of the mountains was typical of much of our local July weather, with the clouds almost hugging the ground and giving every appearance of an impending cloudburst, which never came. Once over Berthoud Pass and on the western slope we found the weather entirely different, it being clear with only a few scattered clouds. At Gore Pass, July 22, we found Boloria helena very abundant. Speyeria mormonia was common and Colias scudderii more common than usual in its haunts. Pieris alexandra and Lycaena helloides also were common and near Toponas in Routt County, L. heteronea was seen in more than usual numbers. The end of July Erebia callias were plentiful and rains in Sept. seemed to increase the number of Hesperia ottoe in the Rocky Flats near Eldorado Springs. August, a month when alpine collecting is usually excellent, was so dry that almost nothing flew in the high country. At the entrance to Rocky Mt. Nat. Park, Lauck reports Eumenis ridingsii common. I have some of the specimens and find them very fresh. This would indicate that they are a second brood, for the normal flight period of this species is the last week of June and the fore part of July in the higher parts of its range. Rotger reports Malacosoma in tremendous numbers at La Veta Pass and Conejos Cañon again this year. At Wolf Creek Pass he found Euphydryas eurytion and Parnassius smintheus common. However, Euphydryas carmentis seemed to be absent from the locality near Pagosa Springs, with a multitude of grasshoppers taking over.

In NEW MEXICO, the southern terminus of the Rocky Mt. Area, the only full report is by Standard, of Belen. His observations coincide in the main with those of the Colorado collectors, including the later appearance, the diminishing numbers, plus the fact that the winter of '49-'50 was the mildest and driest on record for 58 years. Spring was early (but not the appearance of the butterflies) and fall frosts were nearly a month late, with the resulting phenomena that the yucca, lilies and fruit trees bloomed for the second time. It is the first time that anyone can remember the appearance of a second set of blossoms on the yucca. In New Mexico C. lineata appeared in fair numbers, but nothing like those of last year. V. cardui was very scarce until Nov. and then appeared in good numbers. Libytheana bachmanii appeared by the thousands June 29 to July 15. Euptoieta claudia appeared to be making a comeback. This fact was also true in Colorado. Standard reports fair numbers of Ctenucha venosa after an absence of years. Last year in Colo. they were plentiful, but scarce this year. He also reports the appearance of Agraulis vanillae for the first time.

F.T. Thorne reported that extreme dryness prevailed in the Black Range (near Silver City) and around Deming in late August, with butterflies almost non-existent.

In general, a run-down of the various genera shows that the Papilio continued to decrease. Parnassius about normal with a slight increase in the high altitude forms after last year's almost total absence. Neophasia menapia continued scarce. Pieris about normal, with an increase in a couple of the napi forms, particularly in Utah. Euchloe ausonides and olympia down, but Anthocharis sara appearing to gain slightly. Colias about normal. Coenonympha and Minois down slightly. Oeneis uhleri was one that appeared in usual numbers and at the usual time, the middle of May. Oeneis chryxus came back after last year's decrease, but brucei disappeared and lucilla was almost missing. Erebias about balanced, with callias more plentiful and ethela down considerably. All Speyeria were down, as were the Boloria with the exception of helena. Apparently the flight of B. kreimhild was about normal. Melitaea continued poor, with arachne missing, palla good in the north but poor in Colo. Euphydryas and Limenitis poorer than usual. The Lycaena showed an increase in heteronea and helloides over much of their ranges. In the Theclini, the Mitouras had a bad season. Strymon saepium and Incisalia schryveri disappeared. I. eryphon continued in abundance. The scarcity of Plebeius icarioides was noticeable.

Some interesting records were noted this year. One was the aforementioned swarms of Libytheana bachmanii that occurred in New Mexico and the appearance of Agraulis vanillae there. Another was Downey's first record of a Catocala parta for his collecting in Wyoming. Brown reported the reappearance of Danaus berenice in limited numbers (June 17-20). He also captured 4 specimens of Kricogonia lyside, a new record, so far as we know, for the state of Colorado. He also took a Leptotes marina and a Mestra amymone (July 4, Bear Creek Canyon)! Eurema mexicana and nicippe were recorded from several spots, and Lester Smith, a Boulder collector, on June 14 in Gregory Canyon captured a specimen of Heliconius charitonius. My biggest satisfaction came from capturing two Melitaea damoetas after two previous unfruitful summers. They fly in the high rock slides with Erebia magdalena and Lycaena snowii and are harder than either to capture. Rotger, near Durango and Alamosa, and in Costilla County, took specimens of Apodemia mormo after an absence of years. Aside

from these interesting records, the most noteworthy was Brown's discovery of a very large colony of Boloria frigga on the western slope.

In conclusion, I can say that from all recent records, 1947 was the peak year. The following years showed decreases, and 1950 continued the trend. The entire area experienced a late beginning of the collecting season. The extremely dry winter, spring, and summer will in all likelihood cause collecting to continue poor next summer, at least in the southern part of the area where this condition exists. On the optimistic side is the fact that there is already more moisture by Jan.1, 1951, in the mountains here than at any time in the past four years. The snowfall on that date at the city watershed near the Continental Divide measured 119 inches compared with 48 inches at the same time last year and the water content is more than double that of any of the four previous years. Lack of snow and water has not bothered the northern part of the area and the outlook there, barring unusual circumstances this winter, seems to indicate the prospects of a normal season. Weather unfavorable to collecting has been one of the main villains this past summer, and it is doubtful if we will have two summers in succession as poor for collecting as this one was.

Contributors: K. Bowman; F.M. Brown; D. Downey; C. Glasgow; A.G. Lauck; W.C. Minor; J.J. Renk; B. Rotger; C.D. Schryver; O.D. Standard; F.T. Thorne; B.H. Weber.

4. GREAT PLAINS - TEXAS AND EASTERN PLAINS OF ROCKY MTS. STATES TO SASKATCHEWAN AND MANITOBA

by Don B. Stallings
Caldwell, Kansas

For the fourth successive year, at least in the northern half of the Great Plains, cold, wet weather delayed the flight of spring Lepidoptera. No reports were received from collectors south of Kansas.

NORTH

At Transcona, Manitoba, Quelch reported the fall of 1949 very wet and the ensuing winter "cold but not unusual. The spring of 1950 was cold and wet up to May 20th. From then on the weather was about average for Manitoba but collecting was extremely poor all year and strangely enough seemed to get steadily worse as the year progressed. ... Those species present were from two weeks to a month late." The period from May 24 to June 19 is usually one of the best of the year, but in 1950, one Lycaenopsis pseudargiolus was found May 27, nothing June 3, one Pieris rapae June 4. A few species were present in 1950 in usual numbers, namely: Incisalia polios, Lycaena thoe, Coenonympha inornata, Megisto eurytus, Boloria titania (= "chariclea"), Poanes hobomok. Some usually abundant were absent or very scarce: Strymon edwardsii, S. acadica, S. titus, Lycaena dione, L. helloides, Plebeius saepiolus, P. melissa, Glaucopsyche lygdamus, Everes amyntula, Phyciodes gorgone, P. tharos, P. nycteis, Boloria toddi, Colias eurytheme, C. philodice, Erynnis icelus, E.brizo, E. juvenalis, Pyrgus communis.

At Brandon, Manitoba, Bird also reported the spring season late, following an average winter. June 4 was the first fair collecting day and until July 10, the Lepidoptera were in good numbers. Oeneis daura alberta and Carisma garita were commoner than usual. C. inornata, P. saepiolus, G. lygdamus, Papilio glaucus, and E. icelus were in about average numbers. Less common than usual were Papilio ajax, C. philodice, C. eurytheme, P. melissa. The summer was unusually dry and hot and butterflies were scarce after July 10; especially notably reduced were Danaus plexippus, Vanessa cardui, C. eurytheme, C. philodice, Pieris protodice. During the late fall C. eurytheme and philodice were seen flying northward whenever there was a southerly wind. One C. philodice was taken later than ever before, on Nov. 10. New records for the Brandon area were Erebia epipsodea and Carterocephalus palaemon.

MIDDLE

The last part of March a cold front moved into Kansas with the front of the storm running from Fort Scott, Kansas, west and south through Dodge City, Kansas. This front became more or less stationary and held this position with not a great deal of change for nearly 3 weeks. As a result south of this line we had spring, while north of the line it was still winter. In the south part of the State the "spring" condition was static — that is, there was no particular advance of "spring". As a result of all of this the south part of Kansas produced one of the longest spring flights I ever saw. Usually Euchloe olympia flies in numbers only about 2 weeks. Last season we had them for nearly six weeks in good numbers; other spring species responded in the same manner.

However, at Ottawa, Kansas, Howe found the spring delayed, as in Manitoba. In general, he found the 1950 Lepidoptera flights in good numbers. Pieris protodice and rapae appeared March 24, Euchloe olympia Apr.10-May 7. E. olympia and Anthocharis midea were somewhat commoner than usual. Hibernated Anaea andria, Polygonia progne, P. comma, P. interrogationis were unusually numerous, appearing by Apr.2. Vanessa cardui and virginiensis were more numerous and both appeared by Apr.9. All six Papilio species were below average in spring, but P. cresphontes was common by Aug.22. Lycaenopsis pseudargiolus was common Apr.2 - May 6, Incisalia henrici Apr.10 - May 6. Hemiargus isola, far commoner than usual, flew from Apr.7 - late June. Limenitis astyanax and archippus were much below average numbers. Some ab-

FIELD SEASON SUMMARY 4. GREAT PLAINS - concl.

undant species were Junonia coenia, Asterocampa celtis and clyton, Eurema nicippe and lisa, Colias eurytheme, Lethe portlandia, Megisto eurytus, Minois alope (as late as Oct.5), Lycaena dione, Speyeria cybele and S. idalia (as many as 3 on a small blossom), Phyciodes nycteis, P. tharos, P. gorgone.

The Sphingidae in the Ottawa area, already subnormal in 1949, were even fewer in 1950, especially Celerio lineata, Pholus achemon, Sphecodina abbotii, Amphion nessus, Herse cingulata (absent), Sphinx chersis, Ceratomia amyntor. Pachysphinx modesta and Cressonia juglandis were on the upswing. Isogramma hageni, greatly reduced in 1949, increased in 1950 markedly. Pholus pandorus, Deidamia inscriptum, Smerinthus geminatus, Paonias myops, Sphinx vancouverensis were in normal numbers. Ceratomia kansensis was very common. Sphinx eremitoides was taken at Lawrence in August, the first in many years. For the second successive year Catocala species were at a low ebb; only C. illecta and C. innubens were common. Psychomorpha epimenis, usually very scarce, was in tremendous numbers Apr.2 - May 3.

Contributors: C. Bird; W.H. Howe; C.S. Quelch.

5. CENTRAL - MISSOURI TO WEST VIRGINIA, NORTH TO ONTARIO

by P.S. Remington, Jr.
St. Louis, Missouri

Replies were received from 16 of the 33 collectors written to this year. There was general agreement throughout the area that this was the poorest collecting season in many years. As in 1949, we had a mild winter at first, followed by cold, wet weather which delayed the appearance of the usual spring butterflies as much as two weeks, or else they failed to appear at all. About the only family of Lepidoptera reported to be abundant were the Satyridae, which can perhaps be accounted for as due to their habitat in protected woodland areas.

In discussing this report of a "poor year" with several members of the Society at the recent annual meeting in New York City, the question was raised whether assiduous, persistent collecting throughout the season would not have revealed that the Lepidoptera were in truth as abundant as usual, but perhaps appeared later. In other words, did many of us try our usual spots at the usual time for early spring species, find the catch small and get discouraged about further collecting? The writer has determined to get out in the field more during the coming year and discover whether it is really the specimens that are rare or the collector.

MISSOURI. The spring collecting was fully two weeks late. Near St. Louis no Euchloe olympia were seen, for the second year. Its companion species, Anthocharis midea, was sparingly in evidence. The early species, such as Incisalia henrici and Erynnis brizo were not found. For several years visits to localities where the rare Strymon ontario used to be found have been fruitless and this year was no exception. It is feared that this species has almost disappeared from the St. Louis area and will have to be sought in the central Ozarks. During late summer and fall the usual procession of butterflies appeared, though never in great numbers. Phoebis sennae was seen flying high and fast in late fall and also scattered individuals of Danaus plexippus, both species flying in a southerly direction and probably starting a small migration. A field trip in the Indian Summer weather of late October in search of Lerodea l'herminier and the day-flying moth Hemileuca maia was in vain.

ILLINOIS. Lauck, our usually active collector in Alton, was limited in his collecting this year due to illness. He agrees with several other collectors in the zone that Polygonia were not seen at all this year and that all species were fewer in number. Leuschner collected almost every night at lights for moths near Urbana. In mid-April he found Leucania unipuncta, Peridroma saucia and Lycia ursaria. In mid-May Acronicta and related genera appeared in unusually large numbers, including A. interrupta, A. lepusculina, A. oblinata, A. morula, A. americana, and Simyra henrici. He also took Adelocephala bisecta and A. bicolor at this time. Sphingidae were well represented at lights but no species was common. Saturniidae were poorly represented. In late June Datana ministra was common, later replaced by D. integerrima. In October Alabama argillacea was exceedingly common. Leuschner also collected extensively in Chicago and reports the most noticeable trend was the large June flight of Sphingidae found at lights; this is in direct contrast to the report by Woodcock, also from Chicago, who saw no Sphingidae at all. Leuschner's best find was reported to be Sphinx vancouverensis. One surprise later was the almost complete absence of Catocala either at light or sugar.

Woodcock again pursued his project of observing at lights around his home throughout the season and reports that no species was found as plentiful as last year, with some absent, such as Macronoctua onusta. He intends to continue his study another year and then list his results.

INDIANA. Only Wren prepared a report from this State, and his observations were necessarily limited. He records "a remarkable assemblage of butterflies" at Brown County State Park "sitting on the mud and stones along a partially dried up creek. With the exception of some Eurema lisa, all of the butterflies were dark black, bluish, or greenish and of a similar size. This assemblage could be numbered in the hundreds of insects, including Limenitis astyanax, Papilio glaucus glaucus (no yellow turnus at all), P. ajax, P. troilus, P. philenor." Wren's observation is all the more remarkable in that he records "Papilio glaucus glaucus", presumably females. I

know of no other record of female butterflies found on moist spots like this, every other similar case being males. I once saw an "orange cloud" similar to this in Tennessee, consisting of hundreds of individuals of Eurema nicippe sipping the moisture about a mud puddle on the road. I actually caught over a hundred in one swing of the net, and they were all males. It would be interesting if other members of the Society would report on whether they have seen female butterflies at moist spots. Wren also saw Polygonia interrogationis and P. comma "swarming in an abandoned pear orchard" near Indianapolis.

KENTUCKY. There was a very mild winter here, followed by diminution in the number of butterflies, though the correlation is not clear. Merritt and Monroe teamed up on a trip to Okolona to the site of the only known locality of Calephelis borealis in this area. Four specimens were found, but the locality is being destroyed by construction, as so often happens. Other interesting finds were: Incisalia niphon and I. henrici (commoner than usual); Feniseca tarquinius, found for the first time since 1946; Hesperia metea, a new species for Jefferson County; and a series of Cecropterus cellus, the latter from Menifee County June 15. Butterflies were in general much scarcer than in 1946 and 1949.

OHIO. Romine did not find the season good until he sugared for Catocala in August and September, when he had good success. Mrs. Chase at Galion found that the warm winter with its sudden cold spells wiped out the hibernating species Nymphalis antiopa and Vanessa atalanta, as well as Pieris virginiensis. Other species were all scarce until Minois alope appeared and this was abundant and very variable in transitional forms, just as it is in Missouri. At a normally good spot for collecting under lights, there were almost no moths this year. Her reared female Saturniids did not attract a single feral male. From 56 collected cocoons of Hyalophora promethea, only two males emerged, the rest all parasitized by large ichneumon flies. Mrs. Chase also finds that Vanessa cardui, once abundant, is nearly extinct, "due to parasites", as is Nymphalis milberti. Colias philodice was very abundant in October and practically replaced the usually commoner C. eurytheme. It was still flying Nov.6.

MICHIGAN. This state was well reported. The same pattern was observed, with early collecting very poor. V. cardui was seen by Beebe apparently migrating on May 3 and Danaus plexippus on June 8. I presume the above dates would be northward migration INTO the area. Migration southward was reported for D. plexippus July 28 (when Papilio philenor and P. troilus also seemed to be migrating along the course of the Detroit River) to Oct. 26. Lithocolletis crataegi was scarcer than usual.

The detailed observations at Ypsilanti, made by Clench expressly for the Summary, deserve extensive space here. The precipitation was approximately average. A 30-day running average of mean temperature was far above normal during Jan. and early Feb.,went below normal Feb.21-May 10, slightly above normal May 10-July 4, dropping a little below again until Aug.17. Therefore, a nearly normal temperature season, with about a 10-day retardation of spring, lasting nearly three months, and no extremes in winter or summer.

Species emerging at average time at Ypsilanti were Speyeria cybele, Strymon falacer (much commoner than usual), Thymelicus lineola (less than 1948, more than 1949), Poanes hobomok. Two weeks later that usual: Pieris rapae (scarcer), Minois alope (scarcer), Phyciodes tharos (scarcer), Lycaenopsis pseudargiolus 1st brood (scarcer), Everes comyntas 2nd brood (scarcer), Lycaena phleas (scarcer), L. helloides, Polites peckius, Pholisora catullus. Others scarcer than usual were: Papilio ajax, Pieris protodice, Limenitis archippus. Others commoner than usual were: Megisto eurytus, L. pseudargiolus 2nd brood. Others in "normal" numbers were: Strymon caryaevorus, Epargyreus clarus. Notably absent were: Lethe eurydice, L. portlandia, Polygonia spp., Limenitis astyanax, Lycaena thoe. Unusual records included Strymon liparops (July 8) and S. acadica (July 8). Clench noted that most of the delayed species overwinter in open fields, all but lineola of the normal period species overwinter in woods.

Voss, collecting in Cheboygan and Emmet Counties, also took Strymon liparops for the first time, as well as S. falacer (first time), S. titus, S. acadica. Other additions to the regional list include Lycaena dorcas, Atrytone bimacula, and an Erynnis (probably persius). Hesperia laurentina and H. leonardus were abundant after several years of great scarcity. Colias interior and Lycaena epixanthe were very abundant in July. "Pieris napi was common ... for the first time in my experience; and Danaus plexippus definitely continued its increase in numbers, although still less common than nine or ten years ago." All three species of Speyeria -- atlantis, aphrodite, and cybele -- and Boloria selene and toddi were extremely abundant all summer. Voss comments: "Perhaps some of the these apparent increases in numbers were due to the fact that a much greater amount of field work was possible this year", a sage observation for all of us. A full report on the butterflies of Emmet and Cheboygan Counties, Michigan, is in preparation, with special reference to the flower preferences observed for these insects during the past seven years.

Mrs. Hynes, collecting in an area between the last two, continued her rearing of Saturniids and other moths. Very successful in "calling" males to freshly emerged females, except with Automeris io, which seems not to be present in Battle Creek. In one case a male Hyalophora promethea came in the rain as late as Sept. 11.

A new reporter, Perkins, collecting in southern Michigan, found Vanessa atalanta and Pieris rapae flying as early as May 6, and Vanessa virginiensis on May 16, all new early records for Branch County. Also on May 16 he took Papilio marcellus, a notable catch in this area. On May 27 he took Boloria toddi, the first caught in Calhoun County. Shappirio, also in southern Michigan, reported a very cold spring, with the season delayed two to three weeks for virtually all species.

WISCONSIN. The three members reporting all live in the north-central part of the State. Again the report is that April and May were very cold and the butterflies appeared about fifteen days late. Grie-

FIELD SEASON SUMMARY 5. CENTRAL - concl.

wisch reported Lycaenopsis pseudargiolus and that three species of Incisalia were unusually abundant, all taken within a half mile radius in late May: I. niphon, I. irus, and I. augustus. Phyciodes nycteis, Melitaea harrisii, and Hesperia sassacus were not found at all. Colias interior in June was more abundant than usual. Nymphalis j-album, Pieris protodice, Minois alope, and Atrytone ruricola were also very abundant. The season lasted longer than usual, producing Limenitis arthemis even later than Hesperia leonardus in late September. At Chippewa Falls Arnhold reported a scarcity of Catocala, as noted by other collectors in the zone; he found only 2 C. amestris larvae where they were numerous in 1949. The first butterfly he saw was Pieris protodice, on May 14; two weeks later Euchloe olympia was not rare. The first Danaus plexippus, a worn ♀, was seen June 8 at noon, during a period of strong south winds. Sieker reports collecting was the worst in 20 years. Satyridae were fairly normal in abundance. Very few Colias and Pieris were found. The marsh skippers more common than usual. He had fair success with Sphingidae, taking Sphecodina abbotii , Deidamia inscriptum, Amphion nessus on flowers, and at lights in usual numbers he took Ceratomia undulosa, C. amyntor, Paonias excaecata, P. myops, Pachysphinx modesta, Cressonia juglandis, Smerinthus cerisyi. Noctuidae were very scarce at sugar and Geometridae at lights. Most of the Catocala were markedly reduced, but C. cerogama was unusually common; he took one C. judith, a great rarity there. All Wisconsin collectors noted that Megisto eurytus, Minois alope, and Lethe eurydice were in normal numbers in this general poor year.

ONTARIO. Bailey, the only reporter in this area, also records an "unusual" year - a very late spring, followed by a cool, short summer and a cool autumn; no really hot days. He took the spring form of Phyciodes tharos in July, when the summer form usually predominates. P. nycteis was 2 or 3 weeks later than in '48 and '49. Euphydryas phaeton was on schedule (July 25). By the end of July things seemed to be back on schedule. Unusual catches: Junonia coenia, one worn ♀, May 14, a rarity at any time in Ontario; Eurema lisa, a perfect specimen on July 15, his first; Atrytone "arogos" in quantity about June 30, usually rare. Bailey noted a brood of dwarf Pieris rapae in mid-June, immediately overlapped by a brood of normal measurements. It may have been a delayed part of the first brood which flies in early May. At any rate, it flew between two major flights of normal-sized P. rapae and often mingled with them.

- -

Contributors: F.R. Arnhold; E.G. Bailey; R. Beebe; Mrs. Hazel Chase; H.K. Clench; L. Griewisch; Mrs. Vonta Hynes; A.G. Lauck; R. Leuschner; J.R. Merritt; B.L. Monroe, Jr.; O.A. Perkins; R. Romine; D.G. Shappirio; W.E. Sieker; E.G. Voss; H.E. Woodcock; G.R. Wren.

6. SOUTHEAST - FLORIDA TO LOUISIANA, NORTH TO ARKANSAS AND MARYLAND

by Ralph L. Chermock
University, Alabama

Contributions for this area were few. However, much of the material was carefully collected, and proved to be interesting and significant. Unfortunately, all of the information pertained to butterflies, with no observations being made on moths. In general, the season was poor in comparison to previous years.

Fales, collecting in MARYLAND, made a series of interesting observations on the butterflies of that region. His summary of the weather conditions was particularly noteworthy. January and early February were generally mild, with record high temperatures being recorded. During the latter part of February and most of March, the weather was cooler than usual. The Weather Bureau issued the following statement: "The average for November, December, January and February was 43 degrees. But for the first 20 days of March, when the mercury is usually rising, it dropped to an average of 38.2 degrees. Only in 1931-32, when the average was 44.6 degrees, and 1889-90, when it was 44.2, has the area experienced a warmer winter than that just ended. ... As for snow ... no record was found equal to it .... only 2 inches fell, 1/2 less than the previous record in 1930-31." The mean temperatures for April were normal, although a cold wave came during the second week; precipitation was lower than normal. May, June, July, and August had normal temperatures, with greater precipitation except for June. September was also wetter than normal and generally cooler. October and November had higher temperatures and increased precipitation. In general, the year was characterized by milder temperatures and greater precipitation.

Fales made the following observations on butterflies. A number of species appeared later than usual, such as: Euptychia cymela; Minois alope; Speyeria cybele; Everes comyntas; Lycaenopsis pseudargiolus; Anthocharis midea; Papilio glaucus; P. troilus; Proteides clarus; Ancyloxypha numitor and Strymon melinus. Apparently, the cold spell in April was significantly responsible for many of these. The relative abundance of species in relation to that of previous years, seems significant. Those species which had normal flights were Phyciodes tharos, Lycaena phlaeas, Everes comyntas, Eurema lisa, and various species of Erynnis. Papilio marcellus and Pholisora catullus were somewhat more abundant than normal. The following species were relatively scarce: Limenitis arthemis astyanax; Vanessa atalanta; Polygonia interrogationis; Speyeria cybele; Euptoieta claudia;

Incisalia niphon; Colias philodice; Anthocharis midea; Papilio glaucus; P. ajax; and Atalopedes campestris. The following species had very poor flights: Lethe eurydice; Junonia coenia; Vanessa cardui; Speyeria idalia; Incisalia augustus; I. irus; Pyrgus communis; Hylephila phylaeus; and Poanes zabulon. Vanessa atalanta, Aglais antiopa, and Polygonia comma were scarce during the summer months. In summary Fales writes "My general opinion is that it was a poor butterfly season here. This was probably due to the late spring."

Spring collecting in Maryland was reported normal in quality and date by Blevins, despite cool weather. "Mowing of roadsides by County agencies interfered with normal collecting of butterflies at flowers; perhaps for this reason, Phyciodes and Speyeria seemed unusually scarce. In Prince George Co. in Aug. and Sept., skippers were below normal numbers, with the exception of Lerodea l'herminier, Atrytone bimacula, and Poanes zabulon, which were much above normal."

For the DISTRICT OF COLUMBIA area, Shappirio wrote: "The season was unusual, as evidenced in: 1) delayed emergence, by as much as a month, of many species (e.g., most Papilio; the spring form of P. glaucus, which is often seen the first week in April, was noted the last week in May); 2) in certain limited habitats, "sensitive" species, such as A. midea spring form and also spring form ♂♂ of Papilio glaucus, which ordinarily appear in April for a week or two, either did not appear at all or had markedly reduced flight period; 3) greatly reduced numbers of certain species normally common, such as J. coenia; 4) unusually large numbers of certain species, notably M. alope. How much of each of these effects may be due to atypical weather conditions during the winter, is, of course, difficult to determine. It seems certain, however, that a definite effect was exerted by abnormal conditions before the collecting season. In the D.C. and its vicinity, I observed unusually large numbers of M. alope throughout the summer, both by personal observation during June and in August and September, and by reports from persons collecting there then and in July. The species was particularly common in eastern and southern Maryland, Anne Arundel, Montgomery, Prince Georges, and Calvert Counties. Ordinarily, the species is seen in or near woods. During 1950, in addition to being there, individuals were seen frequently in open fields and along roads, areas where they normally do not fly. Perhaps the pressure of so many individuals forced them out of their usual habitats. In collecting trips near Washington between June 14 and June 20, I noticed no swallowtails at all. Later in the season, swallowtails of the species P. glaucus (both color forms), P. ajax, P. troilus, P. philenor, and P. marcellus were present in usual numbers, as observed at Rock Creek Park, Washington, D.C.; Loudoun Co., Va. (Goose Creek), C and O Canal, Montgomery Co., Md., and other localities."

Smith, collecting around Newman, GEORGIA, has submitted a list noting the succession of appearance of the various species found in the area, including the date when first noted in 1950: Colias eurytheme (Jan.26); Eurema nicippe (Jan.26); Erynnis terentius (Feb.27); Papilio ajax (= polyxenes)(Mar. 11); P. glaucus (Mar.15); Pieris rapae (Mar.15); Papilio marcellus (Mar.17); Vanessa cardui (Mar.17); Phoebis sennae (Mar.17); Polygonia interrogationis (Mar.18); Libytheana bachmanii (Mar.18); Everes comyntas (Mar.24); Erynnis horatius (Mar.24); Junonia coenia (Mar.24); Thorybes bathyllus (Mar.26); Proteides clarus (Mar.26); Papilio philenor (Mar.26); Euptychia gemma (Mar.26); Incisalia irus (Mar.26); Danaus plexippus (Mar.29); Phyciodes tharos (Apr.2); Vanessa atalanta (Apr.2); Catia otho (Apr.2); Papilio troilus (Apr.3); Erynnis martialis (Apr.3); Hesperia metea (Apr.3); Eurema jucunda (Apr.8); Euptychia sosybius (Apr.9); Erynnis juvenalis (Apr.9); Achalarus lycidas and Thorybes pylades (Apr.19); Amblyscirtes vialis (Apr.21); Zerene caesonia (Apr.22); Atrytonopsis hianna (Apr.23); Pholisora catullus (Apr.29); Poanes zabulon (Apr.30); Phyciodes ismeria (Apr.30); Limenitis arthemis astyanax (Apr.30); Copaeodes minima and Incisalia niphon (May 5); Pholisora hayhursti, Lycaenopsis pseudargiolus, and Polites brettus (May 11); Oligoria maculata, Strymon melinus, and Amblyscirtes hegon (May 28); Speyeria cybele (July 2); Eurema lisa (July 23); Minois alope (July 23); Hylephila phylaeus (Oct.20).

FLORIDA. Davidson made the following observations in the vicinity of Orlando. In general, the Hesperiids were less common than in 1949 with the exception of Proteides clarus and Ancyloxypha numitor. Strymon m-album, S. cecrops, and Leptotes theonus were also less common, while Atlides halesus, Hemiargus hanno, and Brephidium pseudofea were more abundant. He also noted that "Whereas D. plexippus was quite scarce and D. berenice common throughout 1949, the reverse condition obtained in 1950. A concentration of about 25 individuals of the former were noted at Titusville on the Indian River Nov.15, in a small area suggesting migration."

Gillham, also collecting in Florida, noted that the weather during the latter part of March was fair and hot. From his list, all of the species typical of the area were in flight, although many of the rarer species were not collected. Two specimens of Asbolis capucinus were collected at Delray Beach, with several more being seen.

Concerning Florida, Shappirio wrote: "According to entomologists in northern Florida, especially in Putnam and Marion Counties, the summer of 1950 was one of the driest in recent years. Despite this, during the few days I was there early in September, I could detect no noticeable reduction in numbers of individuals from what would assumedly be normal numbers."

In ALABAMA, the general climatic conditions were as follows. The winter of 1949-50 was exceptionally mild, with only one cold spell, of short duration, characterized by a light snow, but not by exceptionally low temperatures. The spring was normal, although about two weeks later than usual. The summer was normal, with a slight drought characterizing July and August. Autumn was normal, although the winter was earlier than usual, beginning with an exceptionally cold spell beginning on Nov.25, and persisting throughout December. As predicted on the basis of the mild winter, the boll weevils increased in number and seriously affected the cotton

FIELD SEASON SUMMARY 6. SOUTHEAST - cont.

crop. It was expected that we should also have a fine flight of butterflies. However, 1950 proved to be the poorest year for collecting that I have seen since coming south in 1947.

Of those butterflies which characterize the spring flight, Papilio marcellus, Erynnis juvenalis, and Erynnis brizo were exceptionally rare; Everes comyntas, Phyciodes tharos, Eurema lisa, and E. jucunda had normal flights; and Mitoura damon was more abundant than normal, along with Vanessa cardui, which had an exceptionally good flight. During the summer, all of the common butterflies were relatively scarce with the exception of Euptychia sosybia , E. gemma, Lethe portlandia, Eurema lisa and nicippe. Of particular note was the marked rarity of Euptoieta claudia, Agraulis vanillae, Phoebis eubule, Lethe eurydice, and to a lesser extent, Hylephila phylaeus and Atalopedes campestris, normally two of the commonest species found in the area. The fall flight again varied considerably. Lerema accius was somewhat more abundant than normal, while the Pierids and Satyrids were relatively abundant. Many of the Hesperiidae such as Amblyscirtes textor and Eudamus proteus were very rare. The really cold winter stopped the winter flight, and butterflies were almost completely absent during December.

A few observations on certain species are worth mentioning. Heliconius charithonius was collected for the first time in Alabama, near Fairhope, Baldwin Co., on Nov.22, where it apparently is native. The only previous record from any of the Gulf States, exclusive of Florida and southern Texas, was that of Reizenstein (1863) from New Orleans, which is still unverified. Perhaps this species may occur along the Gulf of Mexico as isolated colonies, and additional collecting may throw some light on the possible origin of the Floridian population.

Lethe portlandia, which occurs as a colony near Tuscaloosa, apparently is triple-brooded in this area,-a spring, summer, and fall brood, with only slight overlapping. Lethe creola, which flies in the same area, apparently is only double-brooded, these broods not coinciding directly with any of those of portlandia.

In a survey of the adults of the Screw Worm (Cochliomyia americana), traps baited with citrated whole blood were set out in Clarke County. A number of butterflies were caught representing the following species: Papilio philenor; P. troilus; Junonia coenia; Limenitis arthemis astyanax; Polygonia interrogationis; Asterocampa celtis; Libytheana bachmanii; and Polites brettus. Also collected in the traps were specimens of Amphion nessus and Hemaris diffinis.

Mather, collecting in MISSISSIPPI near Clinton, made a number of interesting observations. He has collected nine species which were not recorded by Hutchins (Can.Ent., 65: 210-213; 1933) who wrote the only available list of butterflies collected in Mississippi.

Hutchins had listed five species which Mather had not seen until this year: Atlides halesus; Danaus berenice; Ascia monuste; Nymphalis antiopa; and Catia otho. He also noted that the following species, which he had collected in previous years, were not observed during 1950: Papilio palamedes; Nathalis iole; Pieris protodice; Lethe portlandia; Vanessa cardui; Erynnis juvenalis; Polites themistocles; and P. brettus.

A few of his observations of certain species deserve quoting. "Colias philodice: out of a large number of specimens of Colias taken at Clinton since 1946 only one specimen assignable to philodice has been taken. It was a small pale male that was taken with a large number of small pale male eurythemes on 23 January, 1949. The second and last specimen of philodice that I have so far taken in Mississippi was a larger darker male taken at Plymouth Bluff in northeast Mississippi on 13 Oct. 1950, flying with a considerable number of larger darker eurytheme.

"Euptoieta claudia: specimens have been taken at Clinton in every year since 1946 and in every month except January, April, and December. In 1950 it was apparently absent until July.

"Goniurus proteus: seen in 1948 in July and October, taken on 14 July; seen in Sept. 1949, but not taken in that year; seen in Oct. and Nov. 1950, and taken on 1, 3, and 22 Oct., more abundant in 1950 than in any previous year.

"The following species have been observed or taken in all 12 months of the year in Clinton: Colias eurytheme; Phoebis sennae; Pieris rapae; and Junonia coenia."

A number of observations have been made on butterfly migrations in southeastern United States. Fales, in Maryland, made the following notes on Danaus plexippus. "April 26, Collected a female Monarch in orchard at Beltsville, Md. This specimen was surely from last fall and probably migrated from away south." "May 6, O.F. Bodenstein reports one Monarch in flight to north over water at Galesville, Md." "July 25, Few Monarchs seen every day now." "Sept.5, In Northern Maryland saw only about 8 Monarchs which were probably migrating south." "Sept.17, Above Cambridge on Route 50 near Easton, Md., in Talbot County, Monarchs were seen several at a time crossing the highways in S.S.E. direction. This was evidence that a weak migration was probably taking place." " Sept.18, Many Monarchs seen in flight in general southward direction in area between Beltsville and Silver Spring, Md." From Sept. 26 to Nov.8, he saw only occasional specimens of this species.

Smith, at Madras, Georgia, lists the number of specimens of Monarchs that he collected as follows: July 26, 12 specimens; Oct. 14, 19 specimens; Oct. 15, 42 specimens; Oct. 27, 267 specimens.

In Tuscaloosa, Alabama, a fairly normal northward migration in the spring was noted throughout April and early May. A ratio of approximately 60% females and 40% males characterized this flight, indicating that both sexes participate in this northward migration. In the fall, the southern migration was noteworthy because of its absence. Only very few individuals were noted during the period when this flight is expected.

A large migration of Ascia monuste was observed on Dauphin Island and the Fort Morgan Peninsula in Mobile Bay, Alabama, flying eastward. These were

all referable to the Floridian subspecies phileta.

Fales made the following observations on the migration of Phoebis sennae eubule in Maryland: "Sept. 10, At Ocean City, P. eubule was abundant." "Sept. 15, Today I watched a northward migration along the beach at edge of ocean at Ocean City of P. eubule at rate of a minimum of 5 per minute (sometimes 10). The altitude varied from 3'-4' to 20'-25'. There was no ground air movement. Some clouds though were going to the northeast. Temperature was 80° F." Similar observations were made on Sept. 16. However, on Sept. 17, he saw only a few specimens of this species. In Tuscaloosa, the spring flight of P. sennae was normal. The fall migration was not as strong as in previous years.

Although the data were sparse for the area, some of the observations seem to be significant. In general, there was a relatively mild winter, with warm temperatures. However, a slight cool spell did tend to retard the arrival of spring, and the emergence of spring butterflies. In Maryland, all of the species which had normal flights are those which are widespread in distribution, and successful in a number of Life Zones. Papilio marcellus, which is essentially more southern in distribution, had a good flight in the spring which may be logically attributed to the mild winter. Among those species which were rarer than normal, many have very wide ranges of distribution, many tend to be more limited to the temperate areas, while a few such as E. claudia and J. coenia are essentially more southern butterflies which are approaching their northernmost limits in Maryland. One would expect those species with more restricted distributions, such as S. idalia, to be more directly affected by temperature changes than those with wide ranges such as P. tharos; but one would also expect those butterflies more characteristic of the warmer regions to be more successful in a mild winter.

In Alabama, the spring flight was also interesting. Papilio marcellus, endemic to eastern United States, was rare in contrast to the flight in Maryland; Erynnis juvenalis and E. brizo, essentially temperate forms, were also rare. The winter might have been too warm for their survival. Eurema lisa and E. jucunda, essentially more southern species, and E. comyntas and P. tharos, which had wide distributions, were able to survive the winter strongly. The summer flight was particularly significant, because many of the common species characteristic of the South, were marked by their rarity, such as A. vanillae, E. claudia, and H. phylaeus. With a mild winter, and an average summer, one would expect a normal or good flight. These data suggest that the relative abundance of these butterflies is not directly correlated with winter temperatures. The ability of many of the species to survive must be related to other environmental factors, or combinations of factors, necessitating more extensive observations on the environment.

Contributors: T.B. Blevins; W.M. Davidson; J.H.Fales; N.W. Gillham; B. Mather; D.G. Shappirio; M.E. Smith.

7. NORTHEAST - DELAWARE AND PENNSYLVANIA NORTH TO SOUTHERN QUEBEC

by Eugene G. Munroe
Ottawa, Ontario

Conditions were somewhat varied in the Northeastern Area in 1950. In southern Quebec and Ontario the early part of the winter was exceptionally mild; this was followed by bitter cold and heavy snowfall in February and March. The spring was only a little delayed and was normally warm. On most of the Atlantic Seaboard, on the other hand, the winter was mild, the snowfall light, and the first warm weather early. The early warm period was, however, soon succeeded by a cool, wet interval, which had the effect of delaying the emergence of many spring species.

In general, the abundance of Lepidoptera seems to have been at a normal or higher than normal level in most regions. Low numbers were reported chiefly from those areas in which large-scale DDT spraying was also reported. Migrants appear to have been scarce. Danaus plexippus appeared in much smaller numbers than in 1949, although the date of arrival in the Montreal region was again early. Vanessa cardui was scarce or absent everywhere. Several species did appear in abnormal abundance, the most conspicuous being Malacosoma disstria, which occurred in very large numbers over a considerable area in southern Canada. On the Atlantic coast, Datana spp. seem to have been unusually abundant: in Connecticut, defoliation was caused by D. drexelii on Vaccinium and Hamamelis and by D. integerrima on Juglans nigra; in New Jersey, Datana sp. defoliated several square miles of scrub oak in the Pine Plains. An outbreak of Alypia octomaculata on the Yale University campus caused defoliation of thousands of square feet of ornamental vines. The detailed summary by regions follows.

PENNSYLVANIA: northeastern Lancaster Co. (Ehle). Butterflies were about normally abundant, their numbers showing some decrease from 1949. Junonia coenia and the three species of Vanessa were very markedly reduced. Euphydryas phaeton and Boloria toddi were unusually common, Euptoieta claudia unusually scarce. Strymon melinus was scarce, S. falacer scarcer than in the past few years, and many individuals dwarfed; S. edwardsii was abundant in clearings in oak scrub; 180 specimens were taken in 2 days; many were unusually fearless or lethargic, and could be picked up with forceps, and even induced to remain on the shoulder or hand of a moving person. One female of S. liparops was taken among the ed-

FIELD SEASON SUMMARY 7. NORTHEAST - cont.

wardsii. Danaus plexippus was present in normal numbers, but no migratory activity was observed. Dates of emergence were normal or a little late. Polygonia comma appeared in numbers on Apr.3, Incisalia augustus on May 7, Mitoura damon on May 27, Papilio glaucus, 1st gen. May 6, 2nd gen. June 18, 3rd gen. Aug.14, Megisto eurytus June 8, Speyeria cybele July 8, Polites cernes Aug.19, Lerodea l'herminier Sept.3.

NEW JERSEY: Pine barrens near Pemberton (Cadbury). Early spring species appeared in normal numbers, but moths later seemed below normal, at least as represented at light. Paonias astylus was scarce, 2 specimens being taken as against 20 in 1948. Heavy DDT dusting from aircraft has been carried on in blueberry fields in 1949 and 1950.

Lakehurst (Ehrlich and Hessel). Mitoura hesseli attracted as many as nine collectors to this locality in a single day, on which between 70 and 100 specimens were taken [one hopes that restraint will be exercised, at least until the range and distribution of the species are better known]. On May 6 Incisalia polios and augustus were in fresh condition, also Erynnis brizo and juvenalis; this is considered to be about 3 weeks late for the locality. On May 13 M. hesseli was at its maximum, nearly 2 weeks later than in 1949. On July 29, 1 Atrytone bimacula was taken in poor weather; on Aug.9 Atrytone dion was common, also Minois alope, Everes comyntas, Atrytone ruricola, and other species. Despite search by a small army of collectors from July 20 to Aug.11 no second flight of M. hesseli was detected, although a full-grown larva was taken on Aug.9.

Other localities (Ehrlich). At Lebanon State Forest, Lycaena epixanthe was enormously abundant on July 1; two collectors took over 500 specimens in an hour; fresh Atrytone bimacula were also frequent; other species were Euptychia areolatus and Strymon falacer. At Springdale on July 7 Calephelis borealis was beginning to appear, Megisto eurytus, and Proteides clarus were common, Strymon falacer was taken; on July 19 C. borealis was frequent and in fresh condition. At Newfoundland, Melitaea harrisii was in good condition on June 22 (unusually late); Euphydryas phaeton was common on that date and persisted until July 19, a very late date. Also at Newfoundland on June 22 were Hesperia sassacus in large, and Poanes hobomok in very large, numbers. On July 19 Strymon titus was emerging, Speyeria cybele, Lycaena phlaeas and Minois alope were common.

Shappirio wrote: "On June 13, 1950, I drove from Akron, Ohio, to Washington, D.C., through East Liverpool, Ohio, Pittsburgh, the Pa. turnpike to Breezewood, Pa., Hancock, Md., and then to Washington. All the way from Akron, Ohio, to the eastern slope of the Appalachian mountains, when it became too late in the day, I saw many dwarf male P. glaucus. The specimens were all fresh, and appeared to be recently emerged. (In Washington, specimens were taken in late May; see other notes.) In general, P. glaucus was more noticeable than usual; between Akron and a point on the Turnpike I counted 35. In a trip to Adams Co., Pa., on June 18, I saw none. It is difficult to explain why none were seen, since Adams Co. is on the eastern slope of the mountains, in an area not far distant from where many were seen only five days before."

NEW YORK: Long Island (Hessel). Most Lepidoptera were below normal numbers, possibly as a result of building projects and of spraying with DDT. Incisalia were more common than usual, especially I. niphon; the first appearance of this species was on May 17, as compared with April 11 in 1949. Vanessa cardui and Phoebis sennae were not seen; Danaus plexippus was perhaps not up to normal numbers; Alabama argillacea was scarce. Saturniids and Catocala were much below normal numbers. Unusual captures were 4 Atreides plebeja, 1 Herse cingulata, 2 Psectraglaea carneosa, 1 Xylotype capax. A good flight of Hemileuca maia occurred on eastern Long Island, where the species had not been seen for several years.

Ithaca (Keji). Dates should be compared with those given in the 1949 summary. The number of different days on which each species was seen is indicated, as well as the range of dates. Papilio ajax, May 24 to Oct.2, 62 days; P. glaucus, June 9 to Aug. 5, 20 days; P. troilus, July 31 to Aug.11, 4 days; Pieris rapae, May 2 to Nov.1, 152 days; Colias eurytheme, June 24 to Nov.7, 73 days; C. philodice, May 24 to Nov.1, 58 days (both Colias were less common than in 1949); Danaus plexippus, June 6 to Oct.30, 68 days (definite indications of southward migration in September and October, with a peak of abundance in the latter part of each of those months); Lethe portlandia not seen; Minois alope, July 9 to Aug.26; Megisto eurytus, June 8 to 26; Speyeria cybele, June 30 to Sept.9, 30 days; Boloria toddi, May 27 to Sept. 14, 10 days; Euphydryas phaeton, June 23; Phyciodes tharos, May 25 to Oct.21, 68 days; Polygonia interrogationis, June 26 to Sept.2, 5 days; Nymphalis antiopa, April 26 to Oct.21, 5 days; Vanessa atalanta, May 5 to Sept.7, 10 days; V. cardui, not seen; Limenitis arthemis, June 13 to Aug.22, 4 days; L. archippus, Aug.7 to Sept.18, 6 days; Lycaena thoe, June 6 to Sept.30, 9 days (scarcer than in 1949); L. hypophlaeas, July 12 to Oct.7, 32 days; Everes comyntas, June 10 to Oct.19, 40 days; Lycaenopsis pseudargiolus, May 22 to Aug.27, 5 days; Proteides clarus, July 26 to Oct.3, 4 days; Pyrgus communis, June 5 to Sept.7, 17 days; Pholisora catullus, May 27 to Aug. 28, 30 days; Thorybes pylades, June 12 to Aug.13, 9 days; Ancyloxypha numitor, June 13 to Sept.7. In general, emergences were considerably later than in 1949.

Sardinia (Rupert). Late summer and all autumn collecting was disappointing; many normally common species of Heterocera were scarce. The autumn migrants, such as Alabama argillacea and Anticarsia gemmatilis, were not seen. Kimball records for the first time from the State: Lycaena dorcas michiganensis, from Fishers, Ontario Co.; and Xylormisa louisiana, from Penfield, Monroe Co.

CONNECTICUT: New Haven region (Remington, Remington, Pease, Bellinger). After a mild winter, the spring was late, cold, and wet. In June the weather improved and the remainder of the season was normal. The early Geometridae appeared by Apr.4; spring but-

terfly dates follow: Lycaenopsis pseudargiolus Apr. 19 to May 4; Erynnis brizo, May 6 to 13; E. juvenalis, May 13 to June 4; Anthocharis midea, May 3 to 13; Strymon melinus, May 6; Lycaena phlaeas, May 27 to June 23; Boloria toddi, May 27 to June 22. These are all 1 to 4 weeks later than corresponding dates for 1949. Mitoura damon and Anthocharis midea were much less common than in 1949. Summer butterflies were for the most part at least as common as in 1949; exceptions were: Melitaea harrisii, Asterocampa celtis, Limenitis astyanax, which were much scarcer; and Euphydryas phaeton, Phyciodes nycteis, Achalarus lycidas, which were somewhat scarcer, than in 1949. Summer dates follow: Papilio glaucus, June 2 to Sept.17; P. troilus, June 2 to Sept.8; Eurema lisa, July 13 to Aug.11, Aug.27 to Sept.6; Euphydryas phaeton, June 22 to July 8; Melitaea harrisii, June 22 to July 13; Speyeria idalia, July 5 to Sept.8; S. cybele, July 5 to Sept.8; Phyciodes tharos, June 2 to July 5, July 19 to Sept.23, Oct.14 (f. marcia); Lethe eurydice, July 5 to Aug.9; Megisto eurytus, June 11 to 28, July 13 to Aug.5; Strymon falacer, June 28 to July 9; Lycaena thoe, June 11 to 22; Atrytone conspicua, July 12 to Aug.5; Poanes hobomok, June 16 to July 8; Pholisora catullus, June 4 to July 5, July 29 to Aug.23; Ancyloxypha numitor, June 18 to July 23, July 31 to Sept.8. Danaus plexippus was first seen on June 4; there was no conspicuous migration. Vanessa cardui was not seen. More numerous than usual were: Poanes zabulon, June 20-22 and Aug.25-28; P. massasoit, July 19 to Aug.5; Atrytone logan, July 14 to Aug.10; Strymon liparops, July 12 to Aug.8; S. acadica, July 19 to 25; Lerodea l'herminier, June 28, Aug.28 to Sept.2. Unusual records were: Hesperia metea, June 2; Junonia coenia, Aug.2 to 8; Papilio cresphontes, Sept.2, also many larvae (date not specified); Pyrgus communis, Oct.8. Utetheisa bella larvae were common on Crotalaria, but adults were rather scarce; Thyridopteryx ephemeraeformis was common for the first time in history. Lycomorpha pholus was numerous in late June; Cisseps fulvicollis and Ctenucha virginica were very abundant, Catocala badia and epione were common; larvae of Lagoa crispata and Sibine stimulea were numerous; Antheraea polyphemus larvae and Samia walkeri cocoons were numerous; Oreta rosea larvae were much scarcer than in 1949.

MASSACHUSETTS: Barnstable (Kimball). In April there was a heavy flight of Agrotis ypsilon, otherwise little activity; later in the season this species was scarce. In July, collecting at light was excellent; in September and October it was unproductive. Response to bait was poor throughout the season. Species less common in 1950 than in 1949 were: Crambidia pallida; Anomogyna elimata (although A. dilucida was common); Schinia arcigera; S. brevis; Doryodes spadaria (2 specimens, as against many in 1949); Gabara bipuncta; Metasiopsis ossularia; and most Crambinae and Phycitinae; Crambus decorellus and Argyria argentana were, however, more common than in 1949. Other species more common than in 1949 were: Lycaena phlaeas; Acronicta spp.; Graphiphora badinodis; Leucania insueta; Oncocnemis riparia; Chamyris cerintha; many Notodontidae; Habrosyne scripta; Paraphia esther; Syssaura puber. The following were not common, but appeared in moderate numbers: Pholus achemon; Ecpantheria deflorata; Paectes pygmaea; Itame latiferrugata. Euclea delphinii was less common than in 1949, and its range of variation was restricted, all specimens belonging to f. viridiclava. Migrants were scarce; only one each of Celerio lineata and Alabama argillacea were taken, and Anticarsia gemmatilis was not seen. Interesting captures were: Ampeloeca versicolor; Citheronia sepulchralis; Papaipema stenoscelis; Atethmia rectifascia; Rhodoecia aurantiago; Eublemma minima; Oruza albocostaliata; Eutelia pulcherrima; Acentropus niveus. New records for the region are: Hydroecia micacea; Cataclysta slossonalis.

NEW HAMPSHIRE (Remington, Remington, Pease, Lennox). Oeneis semidea, Limenitis arthemis, Speyeria atlantis, were all common in the White Mts. in July, and some Byrdia rossi were found. The flight of Boloria montina in August was heavy.

MAINE (Brower, Grey, Blevins). After a mild winter with light snow, warm weather began in April, but was followed by an extended period of cool, cloudy weather. In southern Maine the second half of the season was very dry. Butterflies were scarce except for northern and bog-inhabiting forms, which seemed to prosper; Lycaenidae were perhaps more abundant than usual. Some notes on species follow. Papilio ajax, Augusta, May 21 into June; P. glaucus, Oakland, May 22 into June; Colias eurytheme was almost lacking, but one specimen was identified at Augusta, Oct.20; C. philodice appeared at Eastbrook, May 22, and small numbers followed; C. interior, Mt. Katahdin, July 9; Pieris napi in northwestern Maine, June 9; fresh-looking Danaus plexippus appeared June 6 at Belgrade, was later more numerous than usual in the Augusta region; Megisto eurytus, Belgrade, June 19-20; Oeneis jutta, Passadumkeag, May 30; O. katahdin in average numbers, July 9-10; Speyeria cybele appeared at Augusta, July 3; S. atlantis and aphrodite were scarce; Boloria selene was scarce, appeared at Lincoln, May 29; B. toddi appeared at Oakland, May 22; Phyciodes tharos was scarce, appeared at Eustis, June 9; Polygonia faunus and progne were very numerous near the Quebec border, June 9; Vanessa atalanta was not seen; V. cardui was scarce; Limenitis archippus, Norridgewock, June 10, later scarce; Strymon melinus, Lincoln, May 29, more common than usual at Augusta; Incisalia augustinus, Franklin, May 23, Lincoln, May 27-30, Bar Harbor, June 2; I. polios, Franklin, May 23, Lincoln, May 27; I. niphon, Lincoln, May 27, Belgrade, June 5; I. henrici, Lincoln, May 29; I. lanoraieensis, Lincoln, May 28-30, numerous; Lycaena phlaeas, Bar Harbor, June 2, in reduced numbers throughout the season; Thorybes pylades, Augusta, June 16-17; Erynnis icelus, Franklin, May 23, Eustis, June 9; Ancyloxypha numitor, crest of Mt. Katahdin (!), July 9, Augusta, Aug.15; Hesperia sassacus, Belgrade, June 20; Poanes hobomok, Ellsworth, June 3; Amblyscirtes vialis, Bar Harbor, June 2. Dr. Brower submitted numerous moth records, of which a few are given. Lapara bombycoides, Princeton, July 1-21; Actias luna, more common than usual; Halisidota maculata, Princeton, June 16-July 7; Spaelotis clandestina, Augusta, June 21; Orthosia revicta, Blue Hill, May 22; Hydroecia micacea, Augusta, bred from rhubarb, Aug.8; Liparis dispar, first at

FIELD SEASON SUMMARY 7. NORTHEAST - cont.

Augusta July 29; Malacosoma americana, first at Augusta, July 1; Mesothea incertata, East Orland, May 22, Franklin, May 23; Heliomata cycladata, Smithfield, June 25; Dysmigia loricaria, Kingfield, June 10; Cingilia catenaria, Charlotte, Sept.22, Augusta Oct.3; Metrea ostreonalis, Millinocket, June 29; Sthenopis argenteomaculatus, Brownfield Junction, July 8, Fort Kent, July 16; Hepialus gracilis, Millinocket, Aug.2. Mr. Grey notes that Notodontids were unusually abundant, and that two Sphinx canadensis were taken at Lincoln, the first in several years. A flight of Alabama argillacea was observed at Augusta, Sept.7.

NOVA SCOTIA (McDunnough and Ferguson). The season was an average one for Lepidoptera; butterflies were common in the intervals of damp weather. The first butterflies appeared, as usual, about May 5, and some butterflies persisted until Nov.1. Vanessa cardui, V. virginiensis, and Colias eurytheme were not observed; Danaus plexippus was scarce. Polygonia and Nymphalis remained scarce. The three spp. of Speyeria were numerous from Baddeck southward; Glaucopsyche lygdamus was taken, for the first time on the N.S. mainland, at Halifax. Erynnis juvenalis occurred in numbers at L. Kejimukujik, Queens Co., in late May. Many interesting moths were taken. The following are new records for N.S.: Anomogyna imperita, Mt. Uniacke, Aug.11-18; Epiglaea epiata, various bogs, Sept., Oct.; Phuphena u-album, L. Kejimukujik, May 29; Anacamptodes humaria, Mt. Uniacke, June 7-15. The following species were taken in numbers for the first time: Anomogyna perquiritata, Graphiphora opacifrons, Apharetra dentata, Hillia iris, Harpaglaea sericea, Xanthia lutea, Anathix puta, Oligia minuscula, Eremobina claudens, Nycteola frigidana, Epizeuxis laurenti, Plemyria georgii, Thera juniperata, Eupithecia nimbicolor, E. interruptofasciata. Interesting Microlepidoptera were Olethreutes fulvifrontana and Tortrix alberta.

NEW BRUNSWICK (Rupert and Ferguson). Collecting in northern and eastern N.B. in the period July 8-17 was extremely productive. Butterflies were moderately, moths very plentiful; 211 species were taken. The colony of Papilio brevicauda near Tabusintac was still flourishing. Colias interior was common on heaths and bogs everywhere; several Phyciodes nycteis were taken near Allardville; Plebeius aster was numerous at Grande Anse; P. saepiolus was common on the Tantramar Marshes and near Bathurst. The following are interesting moth records: Apantesis williamsii, Caraquet; Parasemia parthenos, general; Harrisimemna trisignata, Caraquet, Dorchester; Anaplectoides pressus, general; Enargia mephisto, Bathurst; Mycterophora inexplicata, Jacquet River; Scopula frigidaria, Allardville and Jacquet River; Semiothisa perplexa, Dorchester, Caraquet, progeny reared on larch; S. orillata; Dysmigia loricaria, very abundant. Notodontidae were very numerous at a locality near Bathurst; 16 spp. were taken.

QUEBEC: Gaspe Peninsula (Rupert and Ferguson). The account of this expedition is being written up up separately and will appear at a later date.

Forestville, Saguenay Co. (de Ruette and McGillis). Two periods of collecting, in the second week of July and the first week of August, were both very productive of moths, although the second was somewhat marred by cold weather. Among the many spp. taken were: Hemaris diffinis, July 8; Euxoa ochrogaster, numerous, Aug.12-13; Crymodes devastator, Aug.12; Anomogyna dilucida, common; Catocala sordida, ultronia, and blandula, all in small numbers in August (Catocala spp. were much less numerous than in 1948); Malacosoma disstria, July 12; Habrosyne scripta, July 7-12; Oreta rosea f. irrorata, July 13; Calocalpe undulata, July 10-11; Hesperumia sulphuraria; Semiothisa granitata, very numerous, July 8-30. Among unusual records were: Diarsia pseudorosaria freemani, July 12, 1 specimen, the first record from south of Hopedale; Euxoa quebecensis, July 12; Anomogyna imperita, Aug.13; Malacosoma pluviale, Aug.8.

Ste. Anne de Bellevue and vicinity (Gray, Freeman, Hardwick, Munroe, McGillis). Butterflies were in general scarcer than usual. Some records of Lepidoptera follow. Nymphalis j-album, May 5; Caenurgina spp., May 13; Pieris rapae, May 14; Phigalia titea, May 15; Pieris rapae, numerous May 22; Lycaenopsis pseudargiolus and Apaecasia defluata, May 22; Papilio ajax, May 24; Papilio glaucus, May 27; Colias philodice, white female May 29, males May 31; Alypia octomaculata, June 4; Boloria selene, June 4; Phyciodes tharos, June 10; Limenitis archippus, June 18; Poanes hobomok, June 18; Limenitis arthemis, Isia isabella, Ctenucha virginica, all June 22; Spaelotis clandestina, June 23; Ancyloxypha numitor, July 2 (a month earlier than in 1949); Scoliopteryx libatrix, in house July 8; Eulype shastata, Proteides clarus, July 8; Nymphalis antiopa, July 9; Strymon titus, July 10, 19, 20; S. acadica and falacer, July 20; Atrytone ruricola, Speyeria cybele, July 20; Phragmatobia fuliginosa, July 23; Catocala ultronia, July 28; Horisme intestinata, Aug.4; Ancyloxypha numitor, Aug.15; Pyrausta inaequalis, Aug.27; Stamnodes gibbocostata, Aug.30; Lithophane bethunei and Nephelodes emmedonia, Sept.1; Catocala concumbens, Sept.2; Phyciodes tharos, Oct.7; Danaus plexippus, Oct.8; Erannis tiliaria, Oct.18; Colias philodice, Oct.29; Pieris rapae, Nov.3. D. plexippus was scarce; V. cardui and virginiensis were not seen; Polygonia was scarce; Strymon spp. unusually common; an unusual record was Strymon melinus. Pieris virginiensis was taken in small numbers on Ile Perrot in May.

Kirks Ferry, Gatineau District (Beirne). A light trap was operated on a wooded hillside at this locality in May, early June, August, and September. Results were in general good. Some specific records follow: Lycia ursaria, Phigalia titea, Bapta glomeraria, Nyctobia limitaria, all common, May 15-20; Cladara atroliturata, Abbotana clemataria, Aethalura anticaria, May 22; Metarranthis duaria, Anisota rubicunda, May 24; Feralia comstocki in moderate nos. and Xylomiges dolosa very common in May; Habrosyne scripta, Aug.7-10; Calocalpe undulata, Aug.8-9; Caripeta angustiorata, Aug.9; Tolype laricis, Aug.6 to Sept.7; T. velleda, Sept.3; Campaea perlata, Aug.21;

Itame ribearia, Aug.28; Amphidasis cognataria, Aug. 15-26; Crambus latiradiellus, Aug.21-26; Thaumatopsis gibsonellus, abundant in early September.

Special records: An enormous outbreak of Malacosoma disstria larvae occurred in the region of Meach Lake, near Ottawa, in June; Oeneis chryxus strigulosa was taken in numbers near Beechgrove, northwest of Ottawa, constituting a new record for the Province.

Contributors (only those who reported are listed; those whose collecting was reported by others will be found listed under the appropriate regions,above): P.F. Bellinger; A.E. Brower; J.W. Cadbury, 3rd; G. Ehle; P.R. Ehrlich; D.C. Ferguson; N.W. Gillham; P.H.H. Gray; L.P. Grey; D.F. Hardwick; S.A. Hessel; J.A. Keji; C.P. Kimball; D.J. Lennox; R.W. Pease, Jr.; C.L. Remington; J.E. Remington; L.R. Rupert; D.G. Shappirio.

8. FAR NORTH - ALASKA TO LABRADOR

by T.N. Freeman
Ottawa, Ontario

The only source of information this year was the collections of the Northern Insect Survey expeditions. The localities are situated within the coniferous forest and on the barrens of the area between the Mackenzie River and Hudson Bay. Lepidoptera were more numerous at Ft.Smith and Ft.Simpson, N.W.T., than at any other locality that was investigated. This abundance is understandable because those localities are situated well within the rich fauna of the northern boreal forest. Lepidoptera were least abundant at Cambridge Bay, Victoria Island, N.W.T. The scarcity at this latter locality is probably perennial because it is situated in the coldest isothermic band. It is significant that Vanessa cardui, which was very abundant in the north last year, was not seen this year. Following are some notes of the dominant species at each of the places that were investigated.

FORT SIMPSON, N.W.T. This locality is situated near latitude 60° at the junction of the Liard and Mackenzie Rivers. The lepidopterous fauna is southern and no arctic intrusions were collected. Collecting started in early June and most of the species had emerged by early July. Nymphalids were the dominant butterflies and Nymphalis antiopa was extremely abundant. N. j-album and N. milberti were also dominant species. Limenitis arthemis, L. archippus, Papilio glaucus canadensis, Speyeria atlantis, Coenonympha ochracea mackenziei, Lycaena thoe, Everes amyntula, and Boloria selene are a few of the many species which occur at Ft.Simpson and are typical of more southern latitudes. The geometrid Campaea perlata predominated among the larger moths although Crymodes devastator, Catocala briseis, and C. unijuga were very abundant.

FORT SMITH, N.W.T. Situated on the Slave River at the boundary between Alta. and the N.W.T. Collecting started about June 1st and by early July most of the spp. had emerged. The fauna is similar to that of Ft. Simpson. Speyeria atlantis predominated in the collections. Colias christina and C. gigantea were abundant. Most of the species taken at Ft. Simpson were also captured at Ft. Smith with the following significant additions: Anthocharis ausonides, Erebia discoidalis, Boloria freija, Phyciodes tharos, Pieris napi, Plebeius scudderi, P. saepiolus, and Papilio machaon ssp.

GILLAM, MANITOBA. Situated about 180 miles south of Churchill, in northern Manitoba. The area lies in the Northern Transition zone and contains, mainly, those species indigenous to the boreal forest with very few transition zone representatives. The Lepidoptera were not well represented this year either in number of species or number of individuals. Temperatures of 80° F. as well as snow storms occurred in late May and as a result, butterflies did not emerge to any extent before June 1st and emergence continued into July. A few specimens of each of the following were taken but the numbers were not significant to establish dominant forms: Colias pelidne, Speyeria atlantis, Phyciodes tharos, Plebeius scudderi, Boloria frigga, B. freija, B. selene, Anthocharis ausonides (a significant record), Lycaenopsis pseudargiolus, and Incisalia augustus.

ESKIMO POINT, N.W.T. Situated about 175 miles north of Churchill on the west coast of Hudson Bay. The fauna of this tundra locality is essentially arctic with very few accidental intrusions from the boreal forest. Lepidoptera began to emerge in early July and continued to emerge into August. Colias predominated among the genera with nastes, hecla and pelidne the abundant species. Nymphalis antiopa and Archips conflictana represent significant intrusions from the south. Oeneis were rare as was Boloria freija. Erebia rossi ssp., Boloria improba, B. aphirape triclaris, B. polaris and B. chariclea were numerous, triclaris predominate in the genus.

PADLEI, N.W.T. Situated about 150 miles inland from Eskimo Point and containing, for the most part, the same species as those at Eskimo Point. Lepidoptera began emerging in early July. Our little friend Archips conflictana represented an intrusion as at Eskimo Point and apparently is inclined to enjoy cold feet. Erebia rossii and E. fasciata predominated in the collections. Oeneis taygete hanburyi, Colias pelidne, nastes and hecla were abundant. Boloria aphirape triclaris again predominated in this genus; improba, chariclea, polaris and freija were rare.

CHESTERFIELD INLET, N.W.T. Located on the northwest coast of Hudson Bay. The fauna is entirely arctic and the first Lepidoptera emerged in mid-July. Colias was the predominant genus and nastes and hecla

FIELD SEASON SUMMARY 8. FAR NORTH - concl.

were abundant. Boloria, Erebia, and Oeneis were well represented by the usual eastern arctic species. B. aphirape triclaris was not taken. Erebia fasciata was not as abundant as at Padlei.

REPULSE BAY, N.W.T. At the base of the Melville Peninsula and east of the Fox Basin. The ice left the bay on August 4 - the latest in 17 years, according to P.F. Bruggemann, who investigated the area. The fauna is all arctic and collecting starts in early July. Colias hecla and nastes predominated. Boloria improba and polaris were abundant. Erebia rossii was found, but not fasciata. Lycaena phlaeas and Plebeius aquilo were taken. Anarta richardsoni and two pterophorids were prevalent moths.

CAMBRIDGE BAY, N.W.T. On the southern coast of Victoria Island near longitude 105°, just north of the continental land mass. Ice was present in the bay throughout the summer months. The fauna is entirely arctic. Lepidoptera first appeared on July 11. C. nastes and hecla predominated. Boloria was represented by a few specimens of titania ssp. and polaris. A few specimens of P. aquilo, Oeneis melissa assimilis and Erebia rossii were obtained. Lepidoptera were scarce at Cambridge in 1950.

BOOK REVIEWS 18. A Field Guide to the Butterflies of North America, East of the Great Plains, by Alexander B. Klots*

Here is the most important publication on North American butterflies to appear since at least 1931. Most readers of this review will own the volume soon and quickly become familiar with its manner of treatment. Nevertheless, there are so many remarkably good features of the book that it is a pleasure and a duty to point them out in some detail. There are also matters which are either errors or omissions. Then, too, there are points of interpretation to be considered, an aspect which, like most reviewers, I cannot resist developing.

This ideal little book is the newest (and biologically finest) member of the highly successful Field Guide Series, edited by the pioneer in the series, Roger Tory Peterson. The present volume has an amount of valuable detail which seems quite impossible for a book this size. In fact, not since the superb volumes by Scudder has one work presented so much information on the butterflies.

Nearly one-third of the Field Guide is devoted to general instructions and discussions. The first chapter, "How to Use This Book", appears to be directed primarily toward "Teachers and Nature Leaders". It is of questionable value in this book, and the precious space might have been devoted to a few subjects unaccountably missing. However, having thus done his "duty", the author immediately turns to a series of lucid, instructive chapters worth reading for any collector. Their subjects are:

The Butterfly and Its Environment
Life Histories and Growth
The Adult Butterfly
Butterfly Classification.

There are three general Appendices at the end of the volume which will also be useful reference sources:

Some Principles of Classification
Butterfly Literature and Collections
Checklist of Butterflies and Skippers.

The body of the Guide contains the account of all the species of butterflies known to live east of the Great Plains. The many spill-overs from the tropics, found in Florida and Texas, are dealt with very fully. There is a key to the eleven families of butterflies in the East, and each family and subfamily is clearly and tersely characterized in its appropriate place in the text. For nearly every species Dr. Klots has given the preferred habitat, a brief description stressing the identification points, a scanty larval characterization, known foodplants, the number of broods and "spring" flight period, hibernation stage, and distribution. The (geographic) subspecies of the East are listed, with their type localities, ranges, and recognition points. A list of "Casual and Stray Species and False or Dubious Records" is appended with comments.

For some of the most confusing groups there are keys to the species (Riodinidae, Theclinae, Incisalia, Plebeiinae, Erynnis, and other Hesperiidae).

The indices make it easy to turn quickly to the page one is seeking. There is an Index to Technical Terms and General Subjects, an Index to Larval Food Plants (including common names), and an Index to Butterflies (also including common names).

"Every species of importance has been illustrated. Color has been used where it is most important for identification. Usually only the upper- or underside has been shown, whichever shows the better identification characters. In general, species which merely stray into our area have not been illustrated, unless they occur widely enough to cause confusion in identifying native forms." (p.xvi)

Some of the colored plates are exceptionally fine (e.g., pl.8). Dr. Klots struggled a long time steadily improving the quality of printing, but some of the colored plates are poor (e.g., pl.16, fig.14 - Erora laeta; pl.21, fig.15 - Eurema daira lucunda; pl.22, figs.7-10 - Colias spp.; and many Hesperiidae). The plate of larvae is even clearer than Scudder's originals from which it was copied. Some of the black-and-white half-tones are not good (e.g., pl.10, fig.7; pl.18, fig.11), but many are excellent.

*349 pp., 40 pls. Houghton Mifflin Co. Boston. 1951. $3.75.

The most obvious criticisms concern names and in some cases are, of course, matters of opinion. The latin names are unhappily subservient to a curious assemblage of "common" names. It is unfortunate that a book which will have such a profound influence on popular lepidopterology does not step out boldly in guiding amateurs to use latin names rather than follow the trail of ornithologists and British lepidopterists. The reader is encouraged to eschew the neat name Boloria improba and embrace "Dingy Arctic Fritillary" (it is improba ble that any common name user will ever see this species alive). There are scores of scarce species with such "common" names. W.J. Holland, in his books, at least placed the common names parenthetically and inconspicuously. Dr. Klots has coined many "common" names, some in place of well-known and characteristic ones, and many previously used but unrepresentative names are perpetuated. We find Agraulis vanillae still the "Gulf Fritillary" (although it abounds in Missouri, California, etc.), Strymon o. ontario now the "Northern Hairstreak" (its headquarters seem to be the Missouri Ozarks), Erora laeta the "Early Hairstreak" (several fly earlier; this fabulous species deserves a better name), Incisalia augustinus the "Brown Elfin" (this is THE reddish Incisalia; all the others are browner), Lycaeides melissa samuelis the "Karner Blue" (Karner is not even the name of the type locality any longer).

Among the latin names it is a pleasure to have this up-to-date treatment. And yet such a "popular" book, which should perhaps be conservative in names, will mislead inexperienced readers by giving so many untested names. There must be serious doubt that pseudargiolus is a subspecies of the European argiolus, that Tritanassa texana should be regarded as a member of Phyciodes, that Atrytonopsis turneri is a good species. The basis for accepting recent name-changes is not consistent. On one hand extreme "splitting" appears in recognizing Libytheana and Speyeria as full genera (and Semnopsyche as anything at all). In contrast, a "lumper" tendency prevails (in much of which I concur), with Basilarchia a synonym of Limenitis, Battus and Graphium as subgenera of Papilio, Eresia and Tritanassa as subgenera of Phyciodes, Satyrodes and Enodia under Lethe. Consistency appears to require that Speyeria and Enodia get the same treatment; either both are genera or both are subgenera. It is regretted that so many worthless subspecific names have been dignified by recognition. Dr. Klots wrote (p.63): "Considerable liberality has been shown in recognizing the worth of many named subspecies, even though some are no more than distinct 'local forms'." Actually, many are not even DISTINCT local forms and should not be passed in review before the neophyte until systematic revisions have shown them worth retention.

One completely mystifying point is the manner of singling out occasional genera in huge type, with no indication of the reason and no separation of species in genera which immediately follow the heralded genera. For example, from type-size one might think that Nathalis, Appias, Pieris, and Ascia somehow fall under EUREMA and that Euphydryas falls with BOLORIA but not with MELITAEA.

There are doubtless many small errors which will be culled out during the revisions of the book. Dr. Klots, expecting this, wrote (p.63): "I hope that omissions will be called to my attention." A few occurred to me in hastily thumbing through the pages. Euphydryas phaeton is represented (pp.34, 93) with only Chelone glabra as its normal foodplant; in Missouri and southern Connecticut I have found it almost restricted to Aureolaria, even in the presence of C. glabra (Conn.), and O'Byrne has published at some length on Aureolaria as a foodplant. Boloria toddi is said to have "two broods" (p.93), although in Connecticut there are surely three and in the South perhaps more. Cornus florida is listed first among foodplants of Lycaenopsis pseudargiolus, and yet I have on numerous occasions tried to get New Haven females to lay on C. florida buds with almost no success and the few larvae quickly died, although the same females readily laid many eggs on buds of the main spring food, Viburnum acerifolium. The realization to which one is forced in perusing Dr. Klots' thorough compilation of life-histories and foodplants is that we know remarkably little about the eastern North American butterflies. Most published larval descriptions have contained so few comparisons that it would be impossible to gather them together as keys or in any other form assuring correct identification of unknown larvae. Pupae and eggs are even less well known! The foodplant lists doubtless contain many impossible foods.

The most surprising major omission is the failure even to mention the developing field of butterfly genetics. Work in genetics of substantial scientific value is within the scope of most amateur lepidopterists with a flair for successful mass-rearing. Such potential workers deserve a simple explanation of at least simple recessives and dominants and sex-limited genes. E.B. Ford's masterful treatment of butterfly genetics in his Butterflies (see Lep. News, vol.1: p.3) is an example of a simple exposition of genetics. Even many years ago W.T.M. Forbes discussed briefly some possibly genetic forms among American Lepidoptera in his Lepidoptera of New York and Neighboring States, Part I (see Lep. News, vol.1: p.63).

Several features in this book are especially valuable. Guide marks are on the plates, pointing out critical characters, and localities are given for the specimens figured, along with the best recognition points, and the range. The keys to the most difficult species and genera will provide identification for many puzzling specimens. Also helpful are the brief notes on "Similar Species", with means of separating them from the species under discussion.

It is a delight to encounter digressions at many points in the compact prose: the tale of Zizula gaika and its introduction (p.163); Lycaenopsis pseudargiolus as a symbol of spring (p.169); the nomenclature of Danaus plexippus (p.78); the range of Erebia disa mancina (p.77).

This is a rarely fine first edition of a work which is certain to become a standard manual.

C.L. Remington

NOTICES BY MEMBERS

All members may use this column to advertise their offerings and needs in Lepidoptera. There is no cost for this service. Unless withdrawn sooner by the member, each notice will appear in three issues.

Speyeria diana, S. cybele leto and letona, and S. nokomis nitocris, ♂ and ♀ with full data, offered in exchange for needed species of Erebia and Oeneis, esp. the following numbers from McDunnough 1938 list: 127b-e; 130a-c; 135a; 136a; 138b,c; 140; 143a; 144b-c; 147; 147a; 149b-d; 151; 152. Also need any of forms recently described by dos Passos except taygete fordi and rossii gabrieli. If you have some of these species but are not interested in the Speyeria, send list of desiderata. Paul R. Ehrlich, 538 Academy St., Maplewood, N.J.

Lepidoptera of the arid Southwest. Will be collecting in southern New Mexico and southwestern Texas during June, July, and August. Careful attention to lists of desiderata.
L.H. Bridwell, Box 44, Forestburg, Texas.

AMAZON. Collector in northern Brazil accepts orders for prepared Amazonic Lepidoptera and other insects. Walter A. Riffler, Postbox 500, Belém, Estado do Pará, BRASIL.

Butterflies from Arctic and Far North especially Oeneis, Erebia, Boloria, at reasonable prices. R.J. Fitch, 2235 Pandora St., Vancouver, B.C., CANADA.

Lepidoptera of the Southwest for sale, papered or pinned. Inquiry invited. Lots of 100, either Rhop., Macros, or Micros, priced very low, all with full data. Guaranteed first class material. Frank P. Sala, 1764 Colorado Blvd., Los Angeles 41, Calif.

Wanted to buy: Seitz' "Macrolepidoptera of the World" esp. Vols.1,2,6,9,13, English Translation. G.F. Schirmer, 2912 N. 45th St., Milwaukee 10, Wis.

Bio Metal standard redwood insect box, new style, 9 x 13 x 2 ½ inches. Screw on hinge. Satisfaction guaranteed. $2.25 each, $25.00 per dozen. Also Cornell Drawers and unit pinning trays. Equipment constructed to order in our shop. Bio Metal Associates, Box 346, Beverly Hills, Calif.

Butterflies from Ecuador and Argentina. If you are interested as an amateur or a specialist in material collected by William Clark-Macintyre in Ecuador or Juan Foerster in Argentina and Paraguay, write for information and price-lists from F.M. Brown, Fountain Valley School, Colorado Springs, Colorado.

Complete set of Bull. Lep. Soc. Japan, vol.1, nos.1, 2,3, and 4 (108 pp.) (1946) - for sale, 70 cents. including postage. Hiroshi Inoue, 290 Miyamae, Okamachi, Minami-ku, Yokohoma, JAPAN.

For exchange or sale: the very rare Strymon "auretorum" (Bdv.). Also Speyeria. William T. Meyer, 4450 Kingswell Ave., Los Angeles 27, Calif.

Western U.S.A. Lepidoptera offered in exchange for tropical spp., esp. from India, and for Speyeria diana and Anaea spp. Mrs. Emily Henriksen, Route #1, Sunnyside, Washington.

I am considering a collecting trip to the Hudson Bay region of Canada next summer but it will be necessary to sell part of my catch to defray expenses. Write me if you would be interested in purchasing Lepidoptera, Odonata, or Coleoptera from this area. C.S. Quelch, Transcona, Manitoba, CANADA.

For sale or exchange: approximately 300 Manitoba moths especially Arctiidae and Noctuidae. All are pinned. What offers? Charles D. Bird, 1930 Rosser Ave., Brandon, Manitoba, CANADA.

Wanted: Rhopalocera from Africa, Asia, and Oceania in exchange for Rhop. and larger moths from Spanish and European faunas. Very particularly desire all Papilionidae, Delias, Euploea, Cethosia, Charaxes, Kallima, Euphaedra, Euxanthe, and Appias. All correspondence welcomed and answered.
A. Varea de Luque, 13 Ibiza, Madrid, SPAIN.

Speyeria diana ♂ caught this season for sale or exchange for tropical Lepidoptera or Coleoptera. Also have a limited number of Mitoura damon. Theodore Bock, 70 Ehrman Ave., Cincinnati 20, Ohio.

Far Eastern Rhopalocera (Japan, Formosa, Korea,etc.) Wish to exchange with all parts of the world. Have interest in Papilionidae (esp. Parnassius, Archon, Hypermnestra, Zerynthia, etc.), Pieridae, Nymphalidae, and Lycaenidae, etc. Inquiry invited. Yoshihiko Hata, No.594, Aburanocouji Buccouji,Kyoto,JAPAN.

LIVING MATERIAL

Cocoons of Graellsia isabelae ("Spanish luna") and Actias selene (Indian Moon moth), for sale.
O.H. Schroeter, P.O. Box 291, Quaker Hill, Conn.

Join the "Pupa of the Month Club": a pair of living pupae, either Rhop. or Macros each month. Also a list of other available species of the time. Two pair a month for $7.50 per year, postpaid. Four pair a month for $10.00 per year. F.P. Sala, 1764 Colorado Blvd., Los Angeles 41, Calif.

Hyalophora cecropia, H. promethea and Antheraea polyphemus cocoons for exchange for living, mounted, or papered Lepidoptera, esp. Papilionidae and Sphingidae. Will sell H. cecropia only. J.W. Morris, 2704 W. Genesee St., Syracuse 9, N.Y.

For sale or exchange: Eupackardia (Callosamia) calleta cocoons. Robert J. Ford, 3266 Ardmore Ave., South Gate, Calif.

Desire to correspond about rearing with view to exchange of ova next season, esp. Sphingidae and Saturniidae. Mrs. Hazel Chase, 272 N. Union St., Galion, Ohio.

NOMENCLATURE

A. Francis Hemming, Secretary of the International Commission for Zoological Nomenclature, has asked that we bring before the members of the Lepidopterists' Society the question of suppressing the trivial name ajax Linnaeus, 1758 (as published in the binominal combination Papilio ajax). The Commission has been requested by the late A. Steven Corbet to use its plenary powers to suppress the name ajax on the grounds that strict application of the name would cause serious confusion. Corbet found that the name was actually applied by Linnaeus to the common and wide-spread Palearctic and Oriental swallowtail now known as Papilio xuthus Linnaeus. North American lepidopterists will recall that ajax was long used for the Zebra Swallowtail (P. marcellus Cram.) and relatively recently became regarded as the correct name for the common eastern carrot-parsley swallowtail, P. polyxenes asterius (see e.g. McDunnough's 1938 Check List). Lepidopterists interested in nomenclature in all parts of the world are urged to study the relevant literature (see esp. Bull. Zool. Nomen., vol.2: pp.26-30; 1951) and submit their views as soon as possible to Secretary Hemming at the following address:

28 Park Village East
Regent's Park
London, N.W. 1, England

THE O'BYRNE COLLECTION

The life-long collection of butterflies and moths assembled by the late behaviorist Harold I. O'Byrne is being offered for sale by Mrs. O'Byrne. It includes over 4,000 mounted specimens with complete data. Nearly all families are represented, with emphasis primarily on Missouri Rhopalocera, Catocala, and Sphingidae. Some noteworthy aberrations and rarities are included. There are 45 glass-topped cases ranging in size from 12" x 16" to 14" x 22", 16 wooden boxes 9" x 13", and 64 cardboard boxes 9" x 12". The entire collection, including cases, must be sold as a unit. Potential purchasers should write: Mrs. H.I. O'Byrne, Iberia, Missouri.

RESEARCH REQUESTS

Dr. J.W. Tilden, 125 Cedar Lane, San Jose 27, Calif., is engaged in systematic studies of the hesperiid genus Ochlodes and of Strymon californica and S. adenostomatis and is seeking specimens on loan or exchange from all parts of the range of these species, for studies in geographic variation.

Anyone having specimens, records, or published references of butterflies collected in the State of Mississippi is requested to communicate with: Mr. Bryant Mather, P.O. Drawer 2131, Jackson, Miss.

Distribution records for the butterflies of Oklahoma are being assembled by: Dr. W.J. Reinthal, Central State Hospital, Norman, Okla. He requests that all lepidopterists who have specimens from Oklahoma send him information, especially as follows, for each species: number of each sex seen or taken, date, locality and county, collector, biological notes (life history, foodplants, etc.).

TABLE OF CONTENTS

ADDITIONS TO THE LIST OF MEMBERS

Ghika, George, 3900 Hamilton St., F 101, Hyattsville, Maryland. Industrial Melanism.
Harris, Edward, c/o Fitzpatrick's Hotel, Kuranda, North Queensland, AUSTRALIA. LEPID: esp. Hepialidae biology.
Langston, Robert L., 4622 3rd St., La Mesa, Calif. LEPID. Parasites of Zygaenidae. Coll. Ex.
Monteiro, Teodoro (Rev. Pe.), Mosteiro de Singeverga, Negrolos (Minho), PORTUGAL.
Šmelhaus, Jiří, Bělského 4, Praha 7, CZECHOSLOVAKIA.
Speyer, W. (Direktor Dr.), Heikendorf über Kiel 24B, Teichtor 22, GERMANY.
Upton, Murray, North Tamborine, S. Queensland, AUSTRALIA. LEPID: esp. migration.

CHANGES OF ADDRESS

Araujo, R.L. (Dr.), Instituto Biológico, Caixa Postal 7.119, São Paulo Sp., BRASIL.
Kolyer, J.M., 38 Hill Lane, Roslyn Heights, N.Y.
Orfila, R.N.(Dr.), Casilla Correo 2.-Suc.28, Buenos Aires, ARGENTINA.
Rupert, L.R., Sardinia, N.Y.
Schroeter, O.H., P.O. Box 391, Quaker Hill, Conn.

DECEASED

Glasgow, Clyde (Wyoming).
O'Byrne, Harold I. (Missouri).
Sweadner, Walter (Dr.) (Pennsylvania).

THE LEPIDOPTERISTS' NEWS
Official Periodical of The Lepidopterists' Society
One volume of nine numbers published per year

Membership is open to all persons interested in any aspect of the study of butterflies and moths. The 1951 dues, including subscription to the News, are $2.00 for Regular Membership and $5.00 for Sustaining Membership. All remittances should be sent to the Treasurer: Dr. J.B. Ziegler, 18 Baltusrol Place, Summit, N.J., U.S.A. All non-editorial correspondence should be addressed to the Society Secretary: Dr. F.H. Rindge, American Museum of Natural History, New York 24, N.Y., U.S.A.

INDEX TO SUBJECTS IN VOLUME IV

INDEX TO SUBJECTS - cont.

INDEX TO AUTHORS

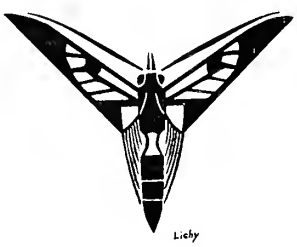
ERRATA FOR VOLUME IV

p.54, right col., line 5 of #298: "Heterocera" should be "Lepidoptera".
p.55, left col., line 2 of #305: "Journ. Sci." should be "Journ. Soc.".
p.62, left col., 10 lines from bottom: "Erynnis brizo somuus" should be "Erynnis brizo somnus".
p.68, left title: "ENTOMOLOGICA" should be "ENTOMOLOGIA".
List of Members, 1949, p.3, and 1950, p.3: "Viette, Pierre P." should be "Viette, Pierre E.L."
[For other errata, see pp.15, 22, 52.]

MAILING DATES FOR VOLUME IV

Nos.1-2: 20 May 1950 List of Members: 27 Dec.1950
No.3: 3 June 1950 Nos.6-7: 3 Mar. 1951
Nos.4-5: 16 Nov.1950 Nos.8-9: (see Vol.V,no.1)

THE LEPIDOPTERISTS' SOCIETY



LIST OF MEMBERS

1950

THE LEPIDOPTERISTS' NEWS
c/o OSBORN ZOOLOGICAL LAB.
NEW HAVEN 11, CONN. U.S.A.

LIST OF MEMBERS OF THE LEPIDOPTERISTS' SOCIETY

November 1950

The list is arranged alphabetically by nations, and by states or provinces in the U.S.A. and Canada. State, province, and nation names are here omitted in the address of each member. The address is followed by the lepidopterological interests. Where only "RHOP.", "MACRO.", or "MICRO." appears, the interest is general. "LEPID." is used where interests include all three of the above groups. Following the interests among taxonomic groups are the other aspects of lepidopterology in which the member is interested. The member's name preceded by an asterisk (*) indicates Charter Membership; his name in capital letters indicates Sustaining Membership. The word "Nearctic" here means America north of Mexico. For uniformity "Phalaenidae" is used for all cases, even though the equivalent name "Noctuidae" had been placed on the membership card by some members. Similarly, Speyeria, Boloria, etc. are used for the NEARCTIC species formerly placed in Argynnis, Brenthis, etc. The following abbreviations are used:

LEPID. - All Lepidoptera
RHOP. - Rhopalocera (butterflies)
MACRO. - Macroheterocera } (moths)
MICRO. - Microlepidoptera }
esp. - especially
Coll. - Collection
Ex. - Exchange

A F R I C A

BELGIAN CONGO

Seydel, Charles, B.P. 712, Elisabethville. LEPID: esp. African. Coll. Sell.

UGANDA

Sevastopulo, D.G., Box 401, Kampala. RHOP. MACRO. Life History, Genetics. Coll. Ex.

A S I A and A U S T R A L A S I A

AUSTRALIA

Common, Ian F.B., Technical Secretary, Council for Scientific and Indust. Research, Div. of Economic Entomology, P.O. Box 109, City, Canberra, A.C.T. MICRO: esp. Australian Tortricidae. Life History. Coll.

Holmes, David R., "Holmden", Red Hill, Victoria. RHOP. MACRO. Coll. Ex.

Smith, Vick T.H., 20 Southway, Yallourn, Victoria. RHOP. Coll. Ex.

CHINA

Loh, P.C., c/o Hagemeyer Trading Co. (Malaya) Ltd., Victory House, Wyndham Street, Hongkong. RHOP: Papilionidae. MACRO: Sphingidae. Coll. Ex.

Lu, Jin-sheng, National Northwestern College of Agriculture, Wukung, Shensi.

INDIA

HIMALAYAN BUTTERFLY CO. (S. Sircar), Shillong, Khasi Hills.

INDONESIA

Straatman, Raymond, Ond. Mata Pao, p/o Sei Rampah, East Coast of Sumatra. RHOP: esp. Papilio, Pieridae, Nymphalidae, Lycaenidae. MACRO: esp. Saturniidae, Sphingidae, Arctiidae, Zygaenidae. Food Plants. Coll. Ex. Sell.

Toxopeus, L.J. (Prof. Dr.), University of Indonesia, Bandung, Java.

Wegner, A.M.R., Museum Zoologicum Bogoriense, Bogor.

JAPAN

Azuma, Masao (Prof.), 27/0 Kamiyoshihara-machi, Nishinomiya, Hyogo Pref. MACRO: esp. Geometridae. MICRO: esp. Pyralidae. Life History, Distribution. Coll. Ex.

Hata, Yoshihiko, No.594, Aburanocouji Buccouji, Kyoto. LEPID: esp. Papilionidae, Lycaenidae, Sphingidae, etc. Coll. Ex.

Inoue, Hiroshi, 290, Miyamae, Oka-machi, Minami-ku, Yokohama. MACRO: esp. Geometridae, Cymatophoridae, Drepanidae. Life History. Coll. Ex.

Iwase, Taro, 345 Komachi Kamakura, Kanagawa-ken. RHOP. Life History, Migration.

JAPAN - cont.

Murayama, Shū'ichi (Prof.), Shinjo-cho 744, Ibaraki-shi, Osaka-fu. RHOP: esp. Parnassidae, Lycaenidae, Neptis, Limenitis, Erebia, Oeneis. Zoogeography. Coll. Ex.

Okada, Yoshio, Editor, Lepidopterological Society of Japan, Yanagida-Cho, Saga, Kyoto. RHOP: esp. Papilionidae, Satyridae, Lycaenidae. Biogeography, Morphology. Coll. Ex.

Okagaki, Hiromu (Dr.), 113, Higashihonzi-machi, Tottori-shi, Tottori Pref. RHOP: Pieridae. MACRO: Geometridae. Comparative Morphology and Genitalia. Coll. Ex.

Shirôzu, Takashi, Entomological Lab., Dept. of Agriculture, Kyushu University, Fukuoka. RHOP. Life History, Food Plants, Distribution. Coll.

Sugitani, Iwahiko (Prof.), Shinmachi-Nishiiri, Nakachojya-machi-doori, Kamikyoku, Kyoto. LEPID: esp. Japanese and Korean Geometridae. Distribution.

KOREA

Seok, D.M., National Science Hall, Chung-ku, Seoul. RHOP: Pieridae, esp. Pieris.

PHILIPPINES

SUSON, F.M., 121 Bonifacio St., Cebu City. RHOP. Coll. Ex.

Uichanco, Leopoldo B. (Dr.), Dean of College, Laguna. RHOP. Distribution. Coll.

E U R O P E

AUSTRIA

Klimesch, Joseph, Linz a.d. Donau, Donatusgasse 4. LEPID: esp. Nepticula, Coleophora, and other leaf miners. Life History, Genetics. Coll. Ex. Sell

Wilcke, Hermann (Dr.), Kössen/Tyrol Nr. 199. RHOP. MACRO: esp. Phalaenidae, Geometridae. Coll. Sell

BELGIUM

Berger, Lucien, 2 vallée des Artistes, Linkebeek-lez-Bruxelles. LEPID.

Dufrane, Abel, Musée d'Histoire Naturelle, Avenue du Tir, 69, Mons. LEPID. of world, esp. MICRO. Coll. Ex.

Janmoulle, Edward, 2 rue Ernotte, Watermael. MICRO: local, esp. Lithocolletis and other leaf-miners. Coll. Ex.

*Kiriakoff, S.G., Zoological Labs., Ghent University, 14 Universiteitsstraat, Ghent. RHOP: esp. Belgian Congo. MACRO: esp. Phalaenoidea, Thyretidae. MICRO: esp. Pyralidae. Phylogeny, Classification. Ex.

Overlaet, Frans G., 9 Chaussée de Louvain, Kortenberg (Brabant). LEPID. Life History, Mimicry. Coll. Ex. Buy. Sell.

CZECHOSLOVAKIA

Cejp, Karel (Prof. Dr.), Botanical Institut, Charles University, Benátská 2, Praha II. LEPID. Entomophytous fungi. Coll. Ex.

Losenicky, Zdeněk, Chválenická 38, Plzeň I. RHOP. MACRO. Coll. Ex.

Poláček, V.B., ul. Komenského, 601/I., Brandýs nad Labem. RHOP.

Povolný, Dalibor (Dr.), Instit. of Applied Entomology, Brno, Zemědělská 1. LEPID. of central Europe: esp. Zygaena, Lithocolletis. Coll. Ex.

DENMARK

Andersen, Axel, Odensegade 7, Ø, Copenhagen. Biology, Distributional Factors. Coll. Ex. Sell.

*Christensen, Georg, Parmagade 24, III, Copenhagen S. RHOP: esp. Argynnis, Phyciodes, Erebia. Genetics. Coll. Ex.

Jensen, Heinz, Kaplevej 23, Kongens Lyngby. RHOP. MACRO: esp. Geometridae, Sphingidae. Coll. Ex.

EIRE

Smartt, John B., 89 Connaught St., Phibsboro, Dublin. RHOP: esp. Papilionidae, Pieridae, Hesperiidae. Life History. Coll. Ex. Buy.

FINLAND

Federley, Harry (Prof. Dr.), Mannerheimvägen 31A, Helsingfors. MACRO: esp. Pygaera and Drepana. Hybridization, Genetics. Ex.

Hackman, Walter (Dr.), Parkgatan 9B, Helsingfors. RHOP. and MACRO. of Scandinavia. MICRO. of Holarctic region, esp. Coleophoridae, Gelechiidae (Phthorimaea). Systematics, Distribution. Coll.

Hellman, E.A. (Mr. and Mrs.), Annank. 2F, Helsinki. RHOP: esp. Pieris, Argynnis, Brenthis. MACRO: esp. Acronycta. MICRO. Coll. Ex. Sell.

Krogerus, Harry (Dr.), Mannerheimvägen 25A, Helsingfors. LEPID: esp. Tortricidae, and Canadian fauna. Coll. Ex.

FRANCE **

Berjot, Etienne E., 1 rue du Plessis-Pommeraye, Creil (Oise). RHOP. MACRO. Life History. Coll. Ex.

Bourgogne, Jean, Muséum d'Histoire Naturelle, 45 bis rue de Buffon, Paris 5e. RHOP. MACRO: esp. Psychidae (Palaearctic and African). Life History, Morphology, Biology. Coll. Ex.

deLesse, Hubert, Laboratoire d'Entomologie, 45 bis rue de Buffon, Paris 5e. RHOP: esp. Nymphalidae, Satyridae (Erebia). Coll. Ex.

Herbulot, Claude, 31 Ave. d'Eylau, Paris 16e. MACRO: esp. Geometridae. Coll. Ex. Buy.

LeCharles, Louis, 22 Avenue des Gobelins, Paris V. RHOP. MACRO: esp. Zygaenidae. MICRO: Crambidae esp. Crambus. Biology. Coll. Ex.

LeMarchand, S., 125 rue de Rome, Paris 17e.

Rousseau-Decelle, Georges, 3 rue de Monceau, Paris 8.

*Stempffer, Henri, 4 rue Saint Antoine, Paris 4e. RHOP: esp. Lycaenidae (Holarctic and African). Coll. Ex.

Varin, Gilbert, 4 avenue de Joinville, Joinville-le-Pont (Seine). RHOP: esp. Nymphalidae, Satyridae. Study of races (subspp.), Geography, Distribution. Coll. Ex.

*Varnier, - , Pension de Famille, "Vieux Moulin", Pont par Semur (Cote d'Or).

Viette, Pierre P., Muséum Nat. d'Histoire Naturelle, 45 bis, Rue de Buffon, Paris 5e. MICRO: esp. Homoneura (Micropterygidae, Eriocraniidae, Hepialidae). ♂ genitalia. Coll. Ex.

GERMANY

Albrecht, Paul, 116 Wilhelmstr., (1) Berlin-Rummelsburg. RHOP. MACRO: esp. Sphingidae, Saturnia. Biology. Coll. Ex.

Amsel, H.G. (Dr.), (17b) Buchenberg bei Peterzell/ Baden.

Börner, Carl (Dr.), Naumburg/Saale 19a, Jenaerstr. 22, (Russian Zone). LEPID: esp. for Phylogenetics. Coll.

Busch, Theo (Herr), (22b) Niederadenau, über Adenau/ Eifel. RHOP: esp. Melitaea. Life History. Coll. Ex.

Cretschmar, Max (Dr.), Casselstr. 21, (20) Celle Hann).

Forster, Walter (Dr.), Menzingerstrasse 67, München 38, (American Zone). RHOP: esp. Lycaenidae. MACRO. Coll. Ex.

Hering, Erich M. (Prof. Dr.), Berlin N.4, Invalidenstr. 43, Zoologisches Museum. MACRO: Pericopidae, Zygaenidae, Dioptidae, etc. MICRO: leafminers of all orders. Coll. Ex.

Hesselbarth, Gerhard, (23) Diepholz (Hann.), Hindenburgstr. 13. Palaearctic RHOP. and MACRO: esp. Papilionidae, Pieridae, Bombyces, Arctiidae. Life History, Zoogeography. Coll. Ex.

de Lattin, Gustaf J. (Dr.), Geilweilerhof, Post Siebeldingen (22a) über Landau/Pfalz, Forschungsinstitut f. Rebenzüchtung. RHOP: Holarctic, esp. Satyridae. MACRO: Holarctic, esp. Acronictinae and Bryophilinae. MICRO: esp. Palearctic. Distribution, Evolution, Genetics. Coll. Ex.

Reichel, Johannes, Koenigsberg Krs. Wetzlar (16). RHOP: esp. Papilionidae. MACRO: esp. Sphingidae, Saturniidae, Arctiidae. MICRO. Life History, Hybridization. Coll. Ex. Buy. Sell.

Rensch, Bernhard (Prof. Dr.), Münster (Westf.), Museum für Naturkunde, Himmelreich-Allee, (British Zone).

Warnecke, Georg (Landgerichtsdirektor), Hohenzollernring 32, Hamburg-Altona. Palaearctic RHOP. and MACRO: esp. Geometridae. Migration, Zoogeography. Coll.

GREAT BRITAIN

ENGLAND

Evans, W.H. (Brig.), Dept. of Entomology, British Museum (Nat. Hist.), Cromwell Road, London S.W. 7. RHOP: esp. Hesperiidae.

*Ford, E.B. (Dr.), University Museum, Oxford. LEPID. Genetics. Coll.

Hards, Charles H., 40 Riverdale Road, Plumstead, London S.E. 18. English and American RHOP. and MACRO: esp. Catocala, Saturniidae. Life History, Migration, Distribution, Variation. Coll. Ex.

Heley, Robert G., "Lygoes", Burcott, Wing, Leighton Buzzard, Beds. RHOP: of world, esp. Pieridae, Nymphalidae, Papilionidae. MACRO: esp. Saturniidae. Distribution, Mimicry. Coll. Ex. Buy. Sell.

Hemming, Francis, 28 Park Village East, Regent's Park, London N.W. 1. RHOP: esp. Palaearctic and Nearctic. Coll. Ex. Buy.

*Jordan, Karl (Dr.), Zoological Museum, Tring, Herts. RHOP. and MACRO. of world.

Lisney, A.A. (Dr.), 'Dune Gate', Clarence Road, Dorchester, Dorset. LEPID. Ecology. Coll.

*Riley, Norman D., 7 McKay Road, London S.W. 20. RHOP.

Rivers, C.F., 'Heatherbank', 250 Shepherds Lane, Dartford, Kent.

**See additions, Fonquernie, Gaillard, p.14

ENGLAND - cont.

Rockingham, N.W. (Lt.Comm.), 40 Ripon Road, Harrogate, Yorkshire. RHOP. MACRO. Migration. Coll. Ex.

Smith, P. Siviter, 21 Melville Hall, Holly Road, Edgbaston, Birmingham 16. RHOP: esp. Lycaena. Coll. Ex. Buy.

*Stevens, Herbert, 4 Beaconsfield Rd., Tring, Herts.

Tams, W.H.T., Dept. of Entomology, British Museum (Nat. Hist.), Cromwell Road, London, S.W. 7. MACRO: esp. Lasiocampidae, Agrotidae. MICRO: esp. Pyralidae, Tinaeidae. Life History.

Warren, Brisbane C.S., 3 Augusta Mansions, Folkestone, Kent. RHOP: esp. Satyridae, Nymphalidae. Life History, Distribution. Coll.

Williams, C.B. (Dr.), Rothamsted Experimental Station, Harpenden, Herts. Migration, Populations, Ecology. Coll. Ex. Buy. Sell.

Wyatt, Colin W., Cobbetts, Farnham, Surrey. RHOP: Palaearctic and Nearctic, esp. Alpine and Arctic spp. Local Races. Coll. Ex. Buy. Sell.

WALES

Henstock, H. (Dr.), Glengariff, Caerwys, North Wales. RHOP: of world. MACRO: of Great Britain. Experimental Moth Trap. Coll. Ex.

HUNGARY

Gozmány, Lancelot A. (Dr.), Széll Kálmán tér. 13, Budapest XII. MICRO. Helophil Moths. Coll. Ex. Sell.

Kovács, L. (Dr.), Budapest, XII. Kléh István u 3/a. III. 1.

Lengyel, Julius F. (Dr.), Budapest XII. Budakeszi ut 38. RHOP: of Europe, esp. Melitaea. MACRO: Phalaenidae, esp. Cucullia. Distribution, Zoogeography. Coll. Ex.

ITALY

Verity, Roger R. (Dr.), Caldine (Firenze). RHOP: esp. Palearctic. Coll. Ex. Buy.

NETHERLANDS

Diakonoff, A. (Dr.), c/o D.M. Tonnis, Jasonstr. 34, Amsterdam- Z. MICRO: all except Pyraloidea. Leaf-miners, Biology, Morphology. Coll. Ex. Buy.

Lempke, B.J., Oude Yselstraat 12^{III} Amsterdam Z-2. RHOP. and MACRO. of Netherlands. Life History.

Lems, K., 38 Kon. Wilhelminalaan, Leidschendam. RHOP. MACRO. Migration. Coll. Ex.

Roepke, W. (Prof. Dr.), Lab. voor Entomologie, Berg 37, Wageningen. RHOP. and MACRO: esp. Palaearctic and Indomalayan. Life History, Ecology, Genetics, Morphology, Histology, Zoogeography, Systematics.

PORTUGAL

da Silva Cruz, Maria A., Quinta de S. João, Candal, Vila Nova de Gaia. RHOP: esp. Melitaea. MACRO: esp. Geometridae. Migration. Coll. Ex.

SPAIN

Agenjo, Ramon, Instituto Español de Entomología, Palacio del Hipódromo, Madrid. LEPID. of Spain. Coll.

Blat, Francisco, Calle Consulado del Mar 3, Valencia.

Hospital, Domingo, Calle Angli 53, Barcelona.

Marten, Werner, calle Guillermo Tell 44, Barcelona. RHOP. MACRO: esp. Zygaena. MICRO. Migration, Biogeography. Coll.

*ROBERT, JOHN H., 41 Ronda San Antonio, Barcelona. RHOP: Pieridae of world,only. Coll. Ex. Buy.

Torres, Juan, 1 Calle Dr. Romagosa, Valencia. RHOP: esp. Papilionidae, Pieridae (Delias, Catopsilia), Danaidae, Heliconiidae, Nymphalidae, Morphidae. MACRO: esp. Zygaenidae, Arctiidae (Arctia, Callimorpha), Saturniidae, Sphingidae, Uraniidae. Life History. Coll. Ex. Buy.

Varea de Luque, Antonio, Calle de Ibiza 13, Madrid.

Vilarrubia, Antonio, Instituto Municipal de Ciencias Naturales, Apartado 593, Barcelona.

SWEDEN

Bryk, Felix, Riksmuseum, Stockholm 50. RHOP. Nervature, Morphologie. MACRO.

Nordström, Frithiof (Dr.), Kungsholmstorg 1, Stockholm. MACRO: esp. Agrotidae, Eupithecia. Life History. Coll.

SWITZERLAND

Loeliger, Robert (Dr.), Susenbergstrasse 20, Zurich. RHOP. MACRO. Migration.

Lüthi, Adrian J., Inneres Sommerhaus, Burgdorf. RHOP. MACRO: esp. Sphingidae. Coll. Ex. Buy. Sell.

Romieux, Jean, chemin des Crêts de Champel 20, Geneva. MICRO: esp. Aegeriidae, Psychidae, Coleophoridae, Scythrididae. Migration. Coll. Ex.

Kesselring, Jorge, (temporary address) Weinbergstr. 166, Zürich. RHOP. MACRO. Life History. Coll. Ex. Buy. Sell.

LATIN AMERICA

ARGENTINA

Bourquin, Fernando F., Calle Conde 1639, Buenos Aires. LEPID: Life History only. Coll.

Breyer, Alberto, Maipu 267, Buenos Aires. RHOP. and MACRO: Argentine only. Coll.

Hayward, Kenneth J. (Prof.), Miguel Lillo 205, Tucumán. RHOP: Neotropical, esp. Argentine and Hesperiidae.

Orfila, Ricardo N. (Dr.), Arcos 2432, Buenos Aires.

Pastrana, José A., Solis 370, Buenos Aires. MICRO: esp. Pyralidoidea, Tortricoidea. Coll. Ex.

Wygodzinsky, Petr W. (Dr.), Instituto de Medicina Regional, Calle Buenos Aires 769, Tucumán. LEPID.

Yiboff, León, Amoretti 184, Ciudadela, Buenos Aires.

BRAZIL

*Araujo, R.L. (Dr.), Instituto Biológico, P.O. Box 119-A, São Paulo. MACRO: esp. Castniidae, Dalceridae. Coll. Buy.

Cardoso, Aldo (Dr.), Avenida Teresa Cristina 65, Maceió, Alagoas. RHOP. MACRO: esp. Saturniidae. Coll. Ex.

d'Almeida, Remualdo F. (Dr.), Rua Viana Junier, 25, Encantado, Rio de Janeiro, D.F. RHOP: esp. Ithomiinae, Pieridae, Papilionidae. MACRO: esp. Syntomidae, Arctiidae, Sphingidae, Saturnioidea. Biology. Coll. Ex. Buy.

Ebert, Heinz (Dr.), Avenida Pasteur 404, Commissão National da Produção Mineral, Rio de Janeiro. RHOP. of world: esp. Lycaenidae. Lepidoptera Photography.

Kesselring, Jorge, (see temporary address in Switzerland).

Oiticica Fº, José (Dr.), Rua Alfredo Chaves 59, Rio de Janeiro. RHOP. MACRO: esp. Sphingidae, Saturniidae. Morphology. Coll. Ex. Buy.

Pearson, Henry R., Caixa Postal 5151, Rio de Janeiro. RHOP. esp. Nearctic Papilionidae. MACRO: esp. Saturniidae, Sphingidae, Mimallonidae. Life History, Food Plants, etc. Coll. Ex. Buy.

Travassos, Lauro (Prof.), Instituto Oswaldo Cruz, Laboratório de Helmintologia, Caixa Postal 926, Rio de Janeiro, D.F. MACRO: esp. Arctiidae, Adelocephalidae. Coll. Ex.

Travassos Fº, Lauro (Dr.), Dept. of Zoologia, Caixa Postal 172-A, São Paulo. MACRO: esp. Ctenuchidae, Pericopidae, Castniidae. Life History. Coll. Ex.

BRITISH WEST INDIES

Lewis, C. Bernard, Science Museum, Institute of Jamaica, Kingston, Jamaica. RHOP. esp. of Jamaica and Cayman Islands. Coll.

Perkins, Lilly G., Sunnybank, Claremont, St. Ann, Jamaica. RHOP. MACRO: esp. Sphingidae. Sell.

CHILE

Herrera González, José (Prof.), Lo Ovalle 0195, Santiago. RHOP: esp. Pieridae, Nymphalidae, Satyridae. Genitalia, Genetics. Coll. Ex.

CUBA

de la Torre y Callejas, S.L. (Dr.), Playa 75 1/2 Matanzas. RHOP: esp. Eurema. Coll. Ex.

ECUADOR

Clarke-Macintyre, William, Cojimies, Prov. Manabí, South American RHOP. and MACRO: esp. Sphingidae, Satyridae. Coll. Ex. Sell.

PUERTO RICO

Ramos, J.A. (Prof.), Biology Department, College of Agricultural and Mechanical Arts, Mayaguez. RHOP. Coll.

VENEZUELA

LICHY, René (Prof.), Parque Sanabria 5 (La Pastora), Caracas. RHOP: Venezuelan only, esp. Eurema. MACRO: esp. Sphingidae of the world. Zoogeography, Ecology. Coll. Ex. Buy.

NORTH AMERICA

CANADA

ALBERTA

BOWMAN, KENNETH, 10240 Wadhurst Rd., Edmonton.

BRITISH COLUMBIA

*Guppy, Richard, R.R. 1, Marine Drive, Wellington. MACRO. Coll. Ex. Sell.

MANITOBA

Bird, Charles, 1930 Rosser Ave., Brandon. RHOP: esp. Hesperiidae, Pieridae. Coll.

MANITOBA (CANADA) - cont.

*Quelch, C.S., Transcona. LEPID: esp. Central and S. American RHOP. Coll. Ex.

NOVA SCOTIA

*Ferguson, Douglas C., Nova Scotia Museum of Science, Halifax. RHOP: Nearctic. MACRO: Nearctic, esp. Geometridae. Life History, Distribution. Coll. Ex.

*McDUNNOUGH, James H. (Dr.), Nova Scotia Museum of Science, Halifax. LEPID: esp. Saturniidae.

ONTARIO

Bailey, Earl G., Tecumseh St., General Delivery, St. Catherines. RHOP. MACRO. Coll. Ex. Sell.

BEIRNE, BRYAN P. (Dr.), Division of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. MACRO. MICRO. Ecology, Distribution. Coll. Ex.

*Freeman, Thomas N. (Dr.), Div. of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. RHOP: esp. of Arctic. MACRO. MICRO. Coll. Ex.

*Hardwick, David F., Div. of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. MACRO: esp. Phalaenidae. Coll. Ex.

*Munroe, E.G. (Dr.), Div. of Entomology, Science Service Bldg., Dept. of Agriculture, Ottawa. RHOP. MACRO. MICRO: esp. Pyralidae and related families. Coll. Ex. Buy.

Wigmore, R.H., Room 111, Science Service Bldg., Carling Ave., Ottawa. MACRO: esp. Phalaenidae. Coll. Ex.

QUEBEC

*Adelphe (Rev. Brother), Ecole Supérieure Richard, 200 Rue Galt, Verdun. RHOP: esp. of eastern Canada. MACRO: esp. Phalaenidae of eastern Canada. Coll.

*GRAY, P.H.H. (Dr.), Box 236, Macdonald College. RHOP. MACRO. Biology. Coll.

Lambert, Robert, Dept. of Lands and Forests, Bureau of Entomology, 53 Grande-Allée, Quebec. MICRO: esp. Tortricidae. Forest Lepidoptera, Biology. Coll.

*Sheppard, Arthur C., 5554 Coolbrook Ave., Montreal 29. LEPID: of Quebec only. Coll. Ex. Buy. Sell.

SASKATCHEWAN

*BRUGGEMANN, PAUL F., R.R. 1, Furness. RHOP. MACRO: esp. Geometridae. MICRO: esp. Hepialidae. Life History. Coll. Ex. Buy. Sell.

Derbowka, Alex M., P.O. Box 17, Wroxton. MICRO. Coll. Buy. Sell.

*Fitch, Richard J., Rivercourse P.O. via Lloydminster. Arctic LEPID. Sell.

UNITED STATES OF AMERICA

ALABAMA

*Chermock, Ralph L. (Dr.), Box 2047, University of Alabama, University. RHOP: esp. Satyridae. Phylogeny. Coll. Ex. Buy.

ARIZONA

*Bauer, David L., P.O. Box 294, Cottonwood. RHOP: esp. Papilio machaon group, Anthocharis, Melitaea, Polygonia, Riodinidae, Plebeius icarioides and races. MACRO. Bionomics, Distribution. Coll. Ex. Buy. Sell.

CALIFORNIA

Baber, Donald L., 1511 Drake Ave., Burlingame. RHOP: esp. Papilionidae and Nymphalidae. Life History. Coll. Ex. Buy. Sell.

*BAUER, WILLIAM R., 235 Liberty St., Petaluma. MACRO. Life History, Collecting Methods. Coll. Ex. Buy.

*Bio Metal Associates, P.O. Box 346, Beverly Hills.

Carls, Erwin W., 1985 E. Phillips Blvd., Pomona. LEPID.

COBB, MELVYN G., 942 W. 34th St., Los Angeles 7. RHOP: esp. Satyridae. Papilionidae. MACRO. Coll. Ex. Buy.

*Comstock, John A. (Dr.), P.O. Box 158, Del Mar. LEPID. Life History. Coll.

Coy, L.P. (Dr.), 328 West Bellevue, San Mateo. RHOP: esp. Speyeria, Euchloe. Coll. Ex.

*Creelman, James L., 2214 Logan Ave., San Diego 13. RHOP: Nearctic and South Pacific. Coll. Ex. Sell.

*CRICKMER, NOEL, Borrego Valley, Julian P.O. LEPID. Coll. Ex.

*Davies, Thomas W., 791 Elsie Ave., San Leandro. RHOP. MACRO. Coll. Ex. Buy. Sell.

*Dickenson, Ronald, P.O. Box 563, Atascadero. RHOP: esp. Speyeria, Boloria, Lycaenidae. MACRO: esp. Saturniidae, Phalaenidae. Life History. Coll.Ex.

Essig, E.O. (Prof.), 112 Agriculture Hall, University of California, Berkeley 4. LEPID: esp. of western North America. Coll.

CALIFORNIA (U.S.A.) - cont.

*Evans, William H., 8711 La Tuna Canyon Road, Sun Valley. LEPID: esp. Annaphila, Heliothiinae, Geometridae. Life History, Photography. Coll. Sell.

*Ford, Robert J., 3266 Ardmore Ave., South Gate. RHOP. MACRO. Life History. Coll. Ex. Buy. Sell.

*Friday, F.W., Box 72, Palm Desert. RHOP. Coll. Ex. Buy. Sell.

Graves, John D., 1711 Short St., Berkeley 2. RHOP. MACRO. Coll. Ex. Buy.

*Guedet, Edward F. (Rev.), 1818 Eddy St., San Francisco 15. MACRO: esp. Geometridae. Coll. Ex. Buy.

HALBERT, RICHARD L., 2446 Cudahy St., Huntington Park. MACRO: esp. Saturniidae. Life History, Cross-breeding. Coll. Ex. Buy. Sell.

*Hammer, William A., 1923 Evergreen Ave., San Leandro. RHOP: esp. Speyeria, Colias, Oeneis. MACRO. Coll. Ex. Buy.

Hartman, Willard D. (Dr.), Dept. of Zoology, University of California, Berkeley 4. RHOP.

Hill, Charles, 1350 San Luis Rey Drive, Glendale 8. MACRO: esp. Phalaenidae of western Nearctic region. Coll. Ex. Buy.

*Hovanitz, William (Dr.), Dept. of Biology, University of San Francisco, San Francisco 17. RHOP. Genetics.

*Hulbirt, Lowell H., 622 N. Bright Ave., Whittier. RHOP: esp. Lycaenidae, Hesperiidae. Coll. Ex.

Karp, Ben, 3148 Foothill Blvd., La Crescenta. MICRO. Coll. Ex. Buy. Sell.

*KIRKWOOD, CARL W., Box 47, Summerland. LEPID. Coll. Ex. Buy.

Laspe, Charles G., 4044 Hawthorne, Palos Verdes Estates. RHOP: esp. Papilionidae. Coll.

Macheboeuf, Charles, Kelseyville. Coll. Ex. Buy. Sell.

*McHENRY, PADDY, 1032 E. Santa Anita, Burbank. Original Descriptions of Nearctic Rhop. Coll.

*MARTIN, LLOYD M., Los Angeles County Museum, Exposition Park, Los Angeles 7. RHOP: esp. Speyeria, Euphydryas, Hesperiidae. Life History. Coll.Ex.

*Mattoni, Rudolf H.T., Div. of Botany, University of California, Los Angeles 24. RHOP: esp. Philotes, Glaucopsyche. Genonomy, Physiology. Coll. Ex. Buy. Sell.

*Meyer, William T., 4450 Kingswell Ave., Hollywood 27. LEPID. Coll. Ex. Buy. Sell.

*NICOLAY, STANLEY S. (Major), Route #3, 9971 Center Drive, Orange. LEPID. Coll.

Petersen, Ray, c/o Mrs. L.S. Petersen, 1624 Chestnut St., Berkeley.

PRESTON, FLOYD W., 217 E. Barton Road, Whittier. RHOP: esp. Pieridae. Coll. Ex.

Reichart, George B., 5580 Estates Drive, Oakland 18.

*Reid, Robert H., Route 3, Box 164, Hemet. RHOP. MACRO. Coll. Ex.

*Roberds, Joseph, 2022 Huntington Lane, Redondo Beach RHOP: esp. Papilio, Speyeria, Colias. Coll. Ex.

Sala, Frank P., 1764 Colorado Blvd., Los Angeles 41. RHOP. MACRO: esp. Saturniidae, Catocala, Phalaenidae. MICRO: esp. Aegeriidae, Cossidae. Life History. Coll. Ex. Sell.

Samuelson, G. Allan, 3824 Walnut Ave., Concord.

Schmela, Dora E. (Mrs.), 135 N. Evergreen Drive, Ventura. RHOP. Coll.

Smith, Edgar A., 1806 Orchard Lane, Merced. LEPID. Life History Photography. Coll. Ex. Buy. Sell.

*SPERRY, JOHN L. (Mr. and Mrs.), 3260 Redwood Drive, Riverside. RHOP: of world. MACRO: esp. Geometridae of world. Coll. Ex. Buy.

*Sternitzky, Robert F., 3895 Redwood Highway So., Santa Rosa. RHOP. and MACRO. of world. Coll. Ex. Buy. Sell.

*Thorne, Fred T., 1298 Merritt Drive, Rt.1, El Cajon. RHOP: esp. Theclinae. Life History. Coll. Ex.

*TILDEN, J.W. (Dr.), 125 Cedar Lane, San Jose. RHOP: esp. Hesperiidae. MICRO. Food Relationships, Behavior. Coll. Ex.

*Weber, Bernie H., 359 E. Angeleno Ave., Burbank. RHOP. Coll. Ex.

Williams, Evelyn G. (Mrs.), North San Juan, Nevada County. RHOP. MACRO. Life History. Coll.

*WIND, ROBERT G., Rt.1, Box 145, Livermore. RHOP: esp. of East Indies. Coll. Ex. Buy. Sell.

Wittman, R.N., Borrego Valley, via Julian. Coll.

COLORADO

*BROWN, F. MARTIN, Fountain Valley School, Colorado Springs. RHOP: esp. Pieridae and Satyridae of neotropics. Distribution. Coll. Ex. Buy.

*Eff, J. Donald, 820 Grant St., Boulder. RHOP: esp. Melitaea, Euphydryas, and Arctic species. Coll. Ex. Sell.

Minor, W.C., P.O. Box 62, Fruita. RHOP: esp. Rocky Mt. fauna. MACRO. Coll. Ex. Buy. Sell.

COLORADO (U.S.A.) - cont.

*Renk, John J. (Brother), Regis College, W. 50th and Lowell Blvd., Denver. RHOP: esp. Catagramma. Coloration. Coll. Ex. Buy.

Rotger, Bernard (Rev.), 257 Fifth Ave., Sacred Heart Church, Durango. RHOP: esp. of Colorado. MACRO. Coll. Ex. Buy. Sell.

Schryver, C.D., 4561 Wolff St., Denver 12. RHOP. Coll. Ex.

CONNECTICUT

Bellinger, Peter F., Osborn Zoological Lab., Yale University, New Haven 11. LEPID. Coloration, Genetics. Coll. Ex.

Bullis, Peter E., 239 West Rock Ave., New Haven. RHOP. Coll. Ex.

*Carpenter, S.C., Box 1344, Hartford 1. RHOP. MACRO. Food Plants.

Pease, Roger W., Jr., Yale Station, New Haven. RHOP. MACRO. Coll. Ex.

*REMINGTON, CHARLES L. (Prof.), Osborn Zoological Lab., Yale University, New Haven 11. LEPID: Genetics and Life History. Coll. Ex. Buy.

*REMINGTON, JEANNE E. (Mrs.), Osborn Zoological Lab., Yale University, New Haven 11.

*Schroeter, Otto H. (Col.), 613 Williams St., New London. RHOP. MACRO. Coll. Ex. Buy. Sell.

*Wilhelm, Herman P., Buckingham Rd., Willimantic. RHOP. MACRO. Coll. Ex. Buy. Sell.

DELAWARE

Jones, Frank Morton (Dr.), 2000 Riverview Ave., Wilmington. LEPID: esp. Psychidae. Coll. Ex. Buy.

DISTRICT OF COLUMBIA

*CLARK, AUSTIN H., Smithsonian Institution, Washington 25. RHOP.

*FIELD, WILLIAM D., Division of Insects, U.S. National Museum, Washington 25. RHOP: esp. Lycaenidae.

*FRANCLEMONT, JOHN G., Division of Insects, U.S. National Museum, Washington 25. MACRO: esp. Phalaenidae, Notodontidae, Lymantriidae. Life History. Coll. Ex. Buy.

Shappirio, David G., 4811 17th St., N.W., Washington 11. LEPID. Chemistry of Insect Pigments. Coll.

FLORIDA

*Berry, Dean F.(Mrs.), Box 146, Orlando.

Davidson, W.M., 1504 Bodell St., Orlando. RHOP. MACRO. Coll.

Forsyth, Marguerite S. (Mrs.), P.O. Box 96, Florida City. RHOP. MACRO. Coll. Sell

*Fuller, Stanley V., Cassadaga P.O., Volusia County. RHOP. MACRO: esp. Sphingidae and Catocalinae. Life History. Coll.

*Grimshawe, Florence M. (Mrs.), 766 N.W. 13th Ave., Miami 35. RHOP. and MACRO. of S. Florida and Keys, esp. Papilio ponceana. Coll. Sell.

*KING, H.L., Box 1171, Sarasota. RHOP. Coll. Ex. Buy. Sell.

MYERS, JOSEPH A., P.O. Box 3074, University Station, Gainesville. LEPID. Coll. Ex. Buy.

GEORGIA

*Eustis, Henry W., 2301 Woodbine Rd., Augusta. RHOP. MACRO. Coll. Ex. Buy. Sell.

*Fattig, P.W., Box 788, Emory University. LEPID. Coll.

*Harris, Lucien, Jr., P.O. Box 167, Avondale Estates. RHOP. MACRO: esp. Catocala, Sphinx. Coll. Ex.

Harris, Lucien, III, 1005 Buckingham Circle N.W., Atlanta.

*Smith, M. Eugene, Rt. #2, Newnan. RHOP. MACRO. Life History.

*TOWERS, ABNER A., 2421 Sagamore Drive N.W., Atlanta. RHOP. and MACRO: Nearctic only. Coll. Ex.

TERRITORY OF HAWAII

*Calkins, Virgil F., P.O. Box 461, U.S. Immigration-Naturalization Service, Honolulu 9, Oahu. RHOP: Nearctic. MACRO: esp. Saturniidae, Sphingidae, Ceratocampidae, Catocala. Coll. Buy. Sell.

VERNON, JOHN B., AF 18 337 431, Radio Security Det. "E", APO 953, c/o Postmaster, San Francisco, Calif. RHOP: esp. Papilionidae and Pieridae. Coll. Ex. Buy. Sell.

IDAHO

MANNING, JAMES H., 1515 N. 26th, Boise. RHOP: Nearctic. MACRO: esp. Catocala, Sphingidae. Coll.Ex.

*WILSON, KENT H., Dept. of Biolcgical Sciences, University of Idaho, Moscow. RHOP: esp. Papilionidae. MACRO: esp. Catocala. MICRO: esp. Jugatae. Life History, etc. Coll. Ex. Buy.

ILLINOIS

Banks, Leslie, 900 Gunnison St., Chicago 40. RHOP. MACRO: esp. Geometridae, Heliothiinae , Notodontidae. Coll. Ex. Buy.

Beall, Geoffrey (Dr.), Research Laboratories, Swift and Company, Chicago 9. Migration.

*BRISTOL, MAURICE L., 511 May St., Elgin. RHOP. MACRO: esp. Apantesis, Catocala, Phalaenidae. Coll. Ex. Buy.

Dluhy, Eugene, 3912 N. Hamilton Ave., Chicago 18. LEPID. Coll. Ex. Buy. Sell.

Evey, J.A., Benson. RHOP: esp. Morpho. MACRO: esp. Catocala. Life History. Coll. Ex.

French, Ellery W., Dept. of Entomology, University of Illinois, Champaign. RHOP. MACRO.

Fulton, Macdonald (Dr.), Dept. of Bacteriology, Loyola School of Medicine, 706 S. Wolcott Ave., Chicago 12. RHOP. Coll.

*Gerhard, W.J., Curator of Insects, Chicago Natural History Museum, Chicago 5. RHOP. MACRO.

*GLENN, MURRAY O., Magnolia. MACRO: esp. Gelechioidea. MICRO. Life History. Coll. Ex. Buy.

Hayes, Joseph B., 1905 N. Pulaski Rd., Chicago 39. RHOP: esp. Papilionidae. MACRO: esp. Catocala. Life History. Coll. Ex. Buy. Sell.

Hessler, Robert, 6510 N. Campbell, Chicago 45. RHOP. MACRO. Coll. Ex. Buy.

*HOLLEY, F.E., 126 E. Ash St., Lombard. RHOP. MACRO: esp. Sphingidae, Saturniidae, Ceratocampidae. Life History. Coll. Ex. Buy.

*IRWIN, RODERICK R., 411 N. Bloomington St., Streator. RHOP. Coll. Ex. Buy.

Jelinek, Anton, 3900 Diversey Ave., Chicago 47. RHOP: of tropics, esp. Morpho, Papilio. Coll. Ex. Buy. Sell.

Kistner, David H., 5031 N. Kolmar Ave., Chicago 30. RHOP: esp. Speyeria. MACRO: esp. Phalaenidae. Distribution. Coll. Ex.

*Lauck, Albert G., 2716 Grandview Ave., Alton. RHOP: esp. Oeneis, Erebia, Boloria, Lycaenidae. Coll. Ex.

Leuschner, Ronald, 1172 S. Wenonah Ave., Oak Park. RHOP: esp. Speyeria, Boloria, Melitaea. MACRO. Coll. Ex.

*McElhose, Arthur L., 816 N. Belmont Ave., Arlington Heights. RHOP. MICRO. Coll. Ex.

Merriam, Elsey E. (Miss), 4520 Clarendon Ave., Chicago 40.

Mills, Kenneth R., 3636 Western Ave., Alton.

*Panske, Leonard G., 878 N. Hermitage Ave., Chicago 22. RHOP. MACRO. Life History. Coll. Buy.

Phillips, Leonard S., 1839 S. Hamlin Ave., (Basement Apt.), Chicago 23. RHOP. MACRO: esp. Catocala. Coll. Ex. Buy. Sell.

Rutkowski, Frank E., 4840 W. Gregory St., Chicago 30. MACRO: esp. Saturniidae, Phalaenidae, Sphingidae. MICRO. Life History. Coll. Buy.

Sasko, V.G. (Prof.), 1937 W. Chicago Ave., Chicago 22. RHOP: esp. Papilionidae, Nymphalidae, Morpho of western hemisphere. MACRO: esp. Sphinx, Saturniidae, Lasiocampidae and smaller moths, Catocala. Life History. Ex. Buy. Sell.

*SCHOENHERR, WILLIAM H., 225 Cedar Ave., Danville. RHOP: esp. Pieridae, Papilio. MACRO: esp. Sphingidae. Distribution, Life History. Coll. Ex. Buy. Sell.

Schwartz, Abel M., 6426 N. Campbell Ave., Chicago 45. RHOP: esp. Polygonia, Basilarchia. MACRO. Polymorphism in P. comma. Coll.

SICHER, HARRY (Dr.), Loyola University School of Dentistry, 1757 W. Harrison St., Chicago 12.

*WOODCOCK, HAROLD E., 6115 Newport Ave., Chicago 34. LEPID. Coll. Ex. Buy.

*Wyatt, Alex K., 5842 N. Kirby Ave., Chicago 30. RHOP. MACRO: esp. Eubaphe, Heliothiinae. Life History. Coll. Ex.

INDIANA

Shields, James, 503 West Sixth St., Marion. RHOP: esp. Papilionoidea. Coll. Ex. Buy.

Wren, George R., 2132 Catherwood Ave., Indianapolis 44. RHOP: esp. Satyridae. Mimicry. Coll.

*Young, Frank N. (Dr.), Dept. of Zoology, Indiana University, Bloomington. Extinction of Rhop. by human agencies.

KANSAS

Bancroft, Larry, 1023 S. Main, Ottawa. LEPID. Coll. Ex. Buy.

Hoffman,J.,1039 S. Mulberry, Ottawa. RHOP: esp. Papilionidae, Pieridae, Nymphalidae. MACRO: esp. Sphingidae, Saturniidae. Coll. Ex. Buy. Sell.

Howe, William, 822 E. Eleventh St., Ottawa. RHOP. MACRO: esp. Sphingidae, Catocalinae. MICRO. Life History, Parasites. Coll. Ex. Buy.

*STALLINGS, DON B., Caldwell. RHOP: esp. Strymon, Euphydryas, Hesperia, Megathymus. Racial Distribution, Seasonal Forms. Coll. Ex. Buy.

KENTUCKY

*Bishop, John A. (Dr.), Jeffersontown. RHOP. MACRO. Coll. Ex. Buy. Sell.

*Cook, Carl, Crailhope. RHOP: esp. Papilionidae of the world. Coll. Ex. Buy. Sell.

Merritt, James R. (Prof.), School of Law, University of Louisville, Louisville 8. RHOP. Coll. Ex. Buy.

Monroe, Burt L., Jr., Ridge Road, Anchorage. RHOP. MACRO. Coll. Ex.

Unseld, James, Jr., Gravel Switch. RHOP: esp. Papilio. MACRO. Life History Photography. Coll. Ex. Buy.

LOUISIANA

Berg, George H., 6006 Spain St., New Orleans. RHOP: esp. Papilionidae of world. Coll. Ex. Buy.

MAINE

*Brower, A.E. (Dr.), 5 Hospital St., Augusta. RHOP: esp. of eastern U.S.A. MACRO: esp. Catocala. MICRO: esp. Aegeriidae. Life History. Coll. Ex. Buy. Sell.

*GREY, L.P., R.F.D., Lincoln. RHOP: Argynninae only. Coll. Ex. Buy. Sell.

MARYLAND**

Blevins, T.B. (Dr.), 3412 Varnum St., Brentwood. RHOP: Papilionoidea, esp. Nymphalidae.

Cross, Frank C., 9413 Second Ave., Silver Spring. RHOP.

Fales, John H., 1917 Elkhart St., Silver Spring. RHOP. MACRO. Life History, Distribution. Coll. Ex. Buy. Sell.

MASSACHUSETTS

*Alexander, Charles P. (Prof.), Fernald Hall, University of Massachusetts, Amherst. Classification, Distribution.

*Bailey, Norman S. (Prof.), Dept. of Biology, Boston University, Boston 15. Life History, Ecology.

Cady, Michael E., 21 Border St., Dedham. RHOP. MICRO. Coll. Ex. Buy.

*Carpenter, A.J., 236 Huntington Ave., Boston. RHOP. Coll. Buy.

*Carpenter, Frank M. (Prof.), Biological Labs., Harvard University, Cambridge 38. Fossil insects.

*Coher, Edward I., 12 Harvard Terrace, Allston 34. Coll. Sell.

Epstein, Hans J., 65 Walker St., Cambridge 38. RHOP: esp. Papilionidae. MACRO: esp. Sphingidae. Coll. Ex. Buy. Sell.

*Gottschalk, Carl W. (Dr.), 21 Chambers St., Boston 14. RHOP: esp. of Arctic. Pigment Metabolism. Coll. Ex. Buy. Sell.

*Johnston, William M., 383 South St., Jamaica Plain. RHOP: of New England. Coll.

Kamp, George W., 44 Holmes Rd., Dedham. Coll. Ex. Buy.

*Learned, Elmer T. (Dr.), 542 Maple St., Fall River. RHOP. MACRO. Genetics.

McCabe, David T., 15 Fitch Road , Wellesley Hills 82. RHOP: esp. Colias. MACRO: esp. Catocala. Coll.

*Murphy, Gardner, 16 Chauncy St., Cambridge 38.

Penny, Robert H., 20 Bound Brook Rd., Newton Highlands 61.

*Robinson, Paul F., 115 Union St., Westfield. RHOP: of New England. Life History, Physiology. Coll. Buy.

*ROGERS, W. PRESCOTT, 353 Lincoln Ave., Fall River. RHOP. Coll. Ex. Buy.

*Smith, Marion E. (Dr.), Fernald Hall, University of Massachusetts, Amherst. MACRO: esp. Arctiidae. Life History. Univ. Coll.

Williams, Carroll M. (Prof.), Biological Labs., Harvard University, Cambridge 38. RHOP. MACRO: esp. Saturniidae. Physiology of metamorphosis. Coll. Buy.

MICHIGAN

*Beebe, Ralph, 4169 Tenth St., Ecorse 29. MICRO. Distribution and Food Plants in Michigan. Coll.

*Clench, Harry K., 1270 Sudbury, Willow Run Village. RHOP: Lycaenidae, esp. Theclinae. Evolution, Phylogeny, Systematics. Coll. Ex.

*Driesbach, Robert R., 301 Helen St., Midland. LEPID. of Michigan. Coll. Ex.

*Hynes, Vonta P. (Mrs.), 152 Meachem Ave., Battle Creek. LEPID. Life History. Coll. Ex. Buy. Sell.

Lewis, Elwyn, 384 E. Warren St., Flint 5.

*McALPINE, WILBUR S., 636 S. Woodward Ave., Birmingham. RHOP: esp. Riodinidae. MACRO: local. Life History. Coll. Ex. Buy. Sell.

**See additions, Stein, p.14

MICHIGAN (U.S.A.) - cont.

*Newman, John H., 9821 Peer Road, R.F.D. #1, South Lyon. LEPID: of Michigan. Coll. Ex.

*Nielsen, M.C., 13661 Castleton, Detroit 27. RHOP. MACRO: esp. Sphingidae, Saturniidae, Phalaenidae. Coll. Ex.

Perkins, Owen A., 1605 Crooks Road, Royal Oak. LEPID: esp. of Michigan. Classification, Distribution. Coll. Ex. Buy.

Richard, Roger E., 1833 N. Highview, Dearborn. RHOP: esp. Asterocampa, Libythea. Photography of Life History. Coll.

*Vogel, Harold A., 9121 Kresge St., Detroit 13. RHOP. MACRO. Coll. Ex.

*VOSS, EDWARD G., Dept. of Botany, University of Michigan, Ann Arbor. LEPID. of Michigan. Coll. Ex.

MINNESOTA

Tveten, John L., Sebeka. RHOP. Coll. Ex. Buy.

MISSISSIPPI

*Mather, Bryant, P.O. Drawer 2131, Jackson. RHOP. Coll.

MISSOURI

*MEINERS, EDWIN P. (Dr.), 6651 Enright Ave., St. Louis. RHOP. MACRO: esp. Arctiidae. Coll. Ex. Buy.

*O'BYRNE, HAROLD I., Iberia. LEPID. Ecology, Behavior. Coll. Ex.

*Pickel, Benjamin H., 3619 Gordon Ave., Overland 21. RHOP: esp. Theclinae. Migration. Ex. Buy. Sell.

*REMINGTON, P. SHELDON, 5570 Etzel Ave., St. Louis 12. RHOP: Hesperiidae, esp. Megathymus and Hesperia, Lycaenidae, Oeneis, Erebia. MACRO: esp. Sphingidae, Saturniidae, Catocala. Coll. Ex. Buy.

*Thomas, George W., 102 Whitten Hall, Dept. of Entomology, University of Missouri, Columbia. MACRO: esp. Phalaenidae (Plusiinae). Parasites. Coll. Ex. Buy. Sell.

NEBRASKA

Froemel, E.A., Columbus. RHOP. MACRO: esp. Catocala. Coll. Ex. Buy.

NORTH DAKOTA

Adler, Julius, 407 Oak St., Grand Forks. Nearctic RHOP. Coll. Ex.

NEW HAMPSHIRE

*GEROULD, JOHN H. (Prof.), 36 Occom Ridge, Hanover. RHOP: Pieridae, esp. Colias. MACRO: esp. Bombyx. Genetics, ecology of Colias; Anatomy and circulation of Bombyx. Mimicry. Coll.

*Lennox, Donald J., R.F.D. #1, Whitefield. RHOP. MACRO. Life History. Coll. Ex.

NEW JERSEY

Boone, Peter, R.F.D. 3, Box 172, Princeton. MACRO: esp. Sphingidae, Ceratocampidae.

Brower, Lincoln P., P.O. Box 111, Madison.

*BUCHHOLZ, OTTO, 493 Markthaler Place, Roselle Park. RHOP. MACRO. Coll. Ex. Buy.

Cadbury, John W., 3rd, Spung Hollow, R.D. #1, Pemberton. MACRO: esp. Phalaenidae, Notodontidae, Sphingidae. Coll. Ex. Buy. Sell.

Comstock, W.P., 117 Lincoln Ave., Newark 4.

*DOS PASSOS, CYRIL F., Washington Corners, Mendham. RHOP: Satyridae, esp. Oeneis, Erebia. Coll. Buy.

*EHRLICH, PAUL R., 538 Academy St., Maplewood. RHOP: Nearctic, esp. Papilio machaon-ajax complex. MACRO. MICRO. Alpine Forms, Distribution. Coll. Ex. Buy. Sell.

Fleming, Henry, Box 338, Coytesville.

MacGregor, C. Russell (Mr. and Mrs.), Corey Lane, Mendham. Coll. Ex.

MUELLER, JOSEPH, 16 Exeter Road, Short Hills. LEPID: of New Jersey only. Life History. Coll.

Naumann, Fred T., 17 Beekman Terrace, Summit. Life History.

OSBORNE, MELVILLE W., 2100 Price St., Rahway. RHOP: esp. Morphidae. MACRO: esp. Saturniidae. Inflation of larvae. Coll. Ex. Sell.

*RAWSON, GEORGE W. (Dr.), c/o Ciba Pharmaceutical Products, Inc., Summit. RHOP. MACRO. Ecology, Distribution, Biochemistry. Coll. Ex.

Ziegler, J. Benjamin (Dr.), 18 Baltusrol Place, Summit. RHOP: Lycaenidae, esp. Theclinae, Riodinidae. Genetics, Ecology, Distribution. Coll. Ex. Buy. Sell.

NEW MEXICO

Eyer, John R. (Dr.), New Mexico Agricultural Experiment Station, State College. MICRO: esp. Lyonetiidae, Hepialidae, Micropterygidae. Morphology, Life History. Coll. Ex.

Standard, O.D., 322 East Coronado Ave., Belen. RHOP: esp. Papilionidae of world. Coll. Ex. Buy. Sell.

NEW YORK

Arntz, Arnold, 110 Spring St., Syracuse. LEPID: esp. of tropics, and Nearctic Sphingidae, Catocala.

Beebe, William (Dr.), Zoological Park, New York 60. RHOP. MACRO. Ecology, Life History. Coll.

*Bell, Ernest L., 150-17 Roosevelt Ave., Flushing. RHOP: esp. Hesperiidae.

*Butterfly Store, The, 77 Madison Ave. at 28th St., New York 16. Buy.

Buxbaum, Paul, 360 Central Park West, New York 25. RHOP: esp. Papilionidae. Coll. Ex. Buy.

*Casselberry, R.C., 55 Edgemont Rd., Scarsdale. RHOP: esp. Papilio. MACRO: esp. Catocala. Coll. Ex. Buy. Sell.

Eisner, Thomas, 45 Lynwood Rd., Scarsdale. RHOP: esp. Riodinidae. Coll. Ex. Buy. Sell.

Farquhar, Donald W. (Dr.), 185 Claremont Ave., New York 27. RHOP. MACRO. Food Plants, Distribution, Life History, etc. Coll. Ex.

*Forbes, William T.M. (Prof.), Comstock Hall, Cornell University, Ithaca. RHOP: esp. Ithomiinae. MACRO. MICRO. Zoogeography, Basic Classification. Coll. Ex. Buy.

*FREDERICK, ALBERT C., 6 Matilda St., Albany 2. RHOP: esp. Lycaenidae, Hesperioidea. Coll. Ex.

Gatti, Arthur, 63 W. Seventh St., Mt. Vernon. RHOP. MACRO. Coll. Ex. Buy. Sell.

Gertsch, W.J. (Dr.), American Museum of Natural History, New York 24. Nearctic RHOP., esp. Lycaenidae.

GILLHAM, NICHOLAS W., No.4 Washington Square North, New York. RHOP: esp. Lycaenidae, Melitaea, Euphydryas, Hesperiidae. Coll. Ex. Buy. Sell.

*HEINEMAN, BERNARD, 247 Church St., New York 13. RHOP: of Jamaica. MACRO: esp. Catocala. Coll.

Hellman, Geoffrey T., 228 E. 61st St., New York 21.

*HESSEL, SIDNEY A., 8 Woodmere Blvd. So., Woodmere, L.I. RHOP. MACRO: esp. Catocala. Coll.

*KEJI, JOSEPH A., Biggs Hospital, Ithaca. MACRO. Life History. Coll.

*KELLNER, JOHN J., 41-03 171st St., Flushing, L.I. RHOP. MACRO. Coll. Ex. Buy.

Kessler, Francis D., 333 Elmwood Ave., Buffalo 9. MACRO: esp. Saturniidae. Life History. Buy.

*KIMBALL, CHARLES P., 205 Culver Road, Rochester. LEPID. Chemical Baits. Coll. Ex. Buy.

*KLOTS, ALEXANDER B. (Prof.), City College of New York, 17 Lexington Ave., New York 10. RHOP: esp. Boloria, Colias. MICRO: esp. Crambinae. Ex.Buy.

Kolyer, John M., 23 High St., East Williston. RHOP. esp. Papilionidae. MACRO. Coll. Buy.

*McELVARE, ROWLAND R., 26 Bogart Ave., Port Washington, L.I. MACRO: esp. Heliothiinae. Coll. Ex. Buy.

Miller, Howard C., 222 N. Collingwood Ave., Syracuse 6. RHOP: esp. tropical Pieridae, Nymphalidae. MACRO. Coll. Buy.

Morris, John W., 2704 W. Genesee St., Syracuse 9. RHOP: esp. Papilionidae. MACRO: esp. Sphingidae. Life History. Coll. Ex. Buy.

*MUELLER, PAUL H., 965 Franklin Ave., Brooklyn 25. RHOP. Coll. Buy.

*NABOKOV, VLADIMIR (Prof.), Dept. of Russian Literature, Cornell University, Ithaca. RHOP: Holarctic; Lycaenidae. MACRO: Palaearctic.

*Rindge, Frederick H., American Museum of Natural History, New York 24. MACRO: esp. Geometridae. Life History. Coll. Ex. Buy. Sell.

*RUPERT, LAURENCE R., 1122 South Main St., Horseheads. MACRO: Geometridae, esp. Ennominae. Life History. Coll. Ex. Buy.

SANFORD, LEONARD J., 101 West 85th St., c/o Webb Realty Co., New York. RHOP: Satyridae, esp. Enodia. MACRO: Saturniidae and Sphingidae only. Distribution, Habitat. Ex.

Shanley, Howard F., 4 Gilbert and Howell Sts., Baldwin, L.I.

*SHOUMATOFF, NICHOLAS, Box 333, Bedford. LEPID: of eastern U.S.A. and West Indies. Distribution, Morphology. Coll. Ex.

Smith, Arthur C., Dept. of Entomology, Cornell University, Ithaca. RHOP. and MACRO. of Mexico and Southwestern U.S.A. Ecology, Distribution. Coll. Ex. Buy. Sell.

*Spelman, M., 2781 Grand Concourse, New York 58. RHOP. Ex. Buy. Sell.

Wagner, Richard, 4533 Third Avenue, Bronx 57. RHOP: esp. Nymphalidae, Papilio. MACRO: esp. Catocala, Saturniidae. Life History. Coll. Ex.

Vrana, Richard T., c/o Reptile House, New York Zoological Society, New York 60. Coll. Ex. Buy.

Wilcox, LeRoy, Speonk, L.I. LEPID. Coll. Ex. Buy. Sell.

OHIO

*BAKER, CLEMENT W., P.O. Box 455, Waynesburg. RHOP. MACRO. Coll. Buy.

Bock, Theodore, 70 Ehrman Ave., Cincinnati 20. RHOP: esp. Ornithoptera, Papilio, Agrias, Morpho. Coll. Ex. Buy. Sell.

OHIO (U.S.A.) - cont.

*Braun, Annette (Dr.), R.R. 13, Box 41C, Cincinnati 30. MICRO: esp. Tineoidea. Life History. Coll.

Chase, Hazel (Mrs.), 272 N. Union St., Galion. RHOP. MACRO: esp. Saturniidae, Arctiidae, etc. Life History, Habits, Ecology. Coll. Ex. Buy. Sell.

Cobb, Robert B., 1109 Asbury Rd., Cincinnati 30. RHOP. MACRO. Coll. Ex. Sell.

*Ferguson, Elias A., 1213 Bellflower Ave. S.W., Canton 10. RHOP: esp. Papilio. MACRO: esp. Catocala. MICRO. Coll. Ex. Buy. Sell.

Gibbs, J. Paxton, c/o James Toy, Box 277, Granville.

*Lindsey, A.W. (Dr.), Dept. of Biology, Denison University, Granville. RHOP: esp. Nearctic Hesperioidea. Taxonomy.

*PRICE, HOMER F., Payne. RHOP. Coll.

Romine, Ray, 954 Westwood Drive, Marion. RHOP. MACRO. Coll. Ex. Buy.

*Smalley, Stephen B., 6129 Glade Ave., Cincinnati 30. RHOP. Life History Photography. Coll. Ex. Buy.

Thomas, Edward S., Ohio State Museum, Columbus 10. RHOP: esp. Hesperioidea, Hair-streaks. MACRO: esp. Catocala. Life History, Distribution.

Thrasher, William, R.D. Route No.2, Garrettsville. RHOP. and MACRO. of the world: esp. Papilionidae and Saturniidae. Coll. Ex. Buy. Sell.

OKLAHOMA

Garlin, Cecil, 1444 North East 12, Oklahoma City 4. RHOP. Coll.

Reinthal, Walfried J. (Dr.), Central State Hospital, Norman. LEPID. Biotopical Conditions, Geographical Races and Variability. Coll. Ex. Sell.

OREGON

*Albright, Ray, Dayton. RHOP. Coll. Ex.

*BAKER, JAMES B., Baker. LEPID. Coll. Ex.

Macy, Ralph W. (Prof.), Reed College, Portland 2. RHOP. MACRO. Biology, Taxonomy. Coll.Ex.Buy.

PENNSYLVANIA

*ACKERMANN, OTTO, 639 Walnut St., Irwin. RHOP. MACRO. Coll. Sell (plastic mounts).

*Adams, J.W., 32 Pleasant St., Philadelphia 19. RHOP: esp. Nearctic Hesperiidae. Taxonomy; Distribution in Relation to Food Plants. Coll. Ex.

*CARY, MARGARET M. (Mrs.), Ellet Lane and Wissahickon Ave., Mt. Airy, Philadelphia 19. MACRO: esp. Sphingidae and Catocala. Life History. Coll.Buy.

EHLE, GEORGE, 314 Atkins Ave., Lancaster. RHOP. Coll. Sell.

*Jay, William, 6358 McCallumn St., Germantown, Philadelphia. RHOP. MICRO. Buy.

Malcolm, John, Jr., 1590 Williamsburg Road, Mt. Lebanon, Pittsburgh 16. RHOP: esp. Pierinae. MACRO. Coll. Ex. Buy.

Mergott, Winston B., 549 Oxford Blvd., Pittsburgh 16. RHOP. MACRO. Coll. Ex.

*MERKER, C.G., 1520 Cooper St., N.S. Pittsburgh 12. LEPID. Coll. Ex. Buy. Sell.

*Moyer, Howard C., Box 238, R.D. #2, Sinking Spring. RHOP. MACRO. Coll. Ex. Sell.

Murchie, William R., Box 203, Sharon. RHOP. Coll. Ex.

*Napier, Arthur H., 503 E. Willow Grove Ave., Chestnut Hill, Philadelphia 18. Nearctic RHOP. MACRO: esp. Sphingidae, Arctiidae, Phalaenidae (Catocala). MICRO: of Pennsylvania. Coll.

*Peters, George, Adamstown. RHOP. MACRO. Coll.Ex. Buy. Sell.

Rupprecht, Jerome (Rev.), St. Vincent Archabbey, Latrobe. RHOP. MACRO. Coll. Ex.

*SWEADNER, WALTER R. (Dr.), Section of Insects and Spiders, Carnegie Museum, Pittsburgh 13. LEPID. Coll. Ex. Buy.

*Tietz, Harrison M. (Dr.), Dept. of Zoology, Pennsylvania State College, State College. MACRO: esp. Phalaenidae. Life History. Coll. Ex.

SOUTH DAKOTA

Sweetman, Harry E., 300 N. Dakota Ave., Sioux Falls. RHOP. and MACRO: esp. of central northwest U.S.A. Life History. Coll. Ex. Buy. Sell.

TEXAS

Anderson, C.A., 3209 Centenary, Dallas 5. RHOP: esp. Danaus plexippus. Life History, Migration.

*Bridwell, L.H., Box 44, Forestburg. RHOP: esp. Incisalia. MACRO: esp. Catocala. Ex. Buy. Sell.

*FREEMAN, HUGH A., 1335 Overhill Drive, Garland. RHOP: esp. Hesperioidea, Theclinae. Taxonomy, Ecology. Coll. Ex. Buy. Sell.

*GLICK, P.A., Bureau of Entomology and Plant Quar., Box 143, College Station. RHOP: esp. Papilionidae. MACRO: esp. Catocala, Saturniidae. Aerial Insect Dissemination and Migration, Cotton Insects. Coll. Buy.

TEXAS (U.S.A.) - cont.

Kinch, Everard M., 4223 Jerry Lane, Fort Worth. RHOP. Coll. Ex.

*Orchard, C.D., 803 W. Lynwood, San Antonio 1. Coll.

Ryan, Charlton (Miss), 1822 Huff St., Wichita Falls. RHOP. Coll. Ex. Sell.

*STRUCK, B., P.O. Drawer 271, Brownsville. RHOP.

UTAH

*Downey, John C., Biology Dept., University of Utah, Salt Lake City 1. RHOP: esp. Lycaenidae. Coll. Ex.

PHILLIPS, W. LEVI, 985 S. Third East, Salt Lake City 4. MACRO: esp. Pseudohazis.

VIRGINIA

Rozman, Robert, 726 N. Buchanan St., Arlington. RHOP. MACRO. Coll. Ex.

VERMONT

Werner, Floyd G. (Dr.), Dept. of Zoology, University of Vermont, Burlington.

WASHINGTON

*Anderson, Andrew, P.O. Box 192, Pateros. RHOP. Coll. Ex.

*COOK, WILLIAM C. (Dr.), 219 Newell St., Walla Walla. MACRO: esp. Phalaenidae. Ecology, Distribution. Coll. Ex.

*Frechin, Donald P., 1504 N. Lafayette, Bremerton. RHOP: esp. Euphydryas, Mitoura. MACRO: esp. Washington diurnals. Life History. Coll. Ex. Buy.

Henriksen, Emily (Mrs.), Route 1, Sunnyside. RHOP. MACRO. Coll. Ex. Sell.

*Hopfinger, John C., Brewster. RHOP: esp. Satyridae, Lycaenidae. MACRO: esp. Saturniidae. Migration. Coll. Ex. Buy. Sell.

Jennings, Dean, 2825 Louisiana, Longview.

*Johnston, Edward C., 2268 E. 60th St., Seattle 5. LEPID. Coll. Ex.

*Whittaker, Robert H. (Dr.), Dept. of Zoology, Washington State College, Pullman. RHOP. Ecology, Distribution. Coll.

WISCONSIN

*Arnhold, F.R., Route 3, Chippewa Falls. RHOP. MACRO. Coll. Ex. Buy.

EUTING, NEIL A., Route 4, Box 11B, Oconomowoc. RHOP. MACRO. Coll. Ex. Buy.

*GRIEWISCH, LOUIS W., 114 Gray St., Green Bay. RHOP. MACRO. Coll. Ex. Buy.

Jablonski, Raymond, 922 E. Knapp St., Milwaukee. RHOP: esp. Papilio, Thecla. Life History, Migration. Coll. Ex. Buy. Sell.

*MOECK, ARTHUR H., 301 E. Armour Ave., Milwaukee 7. RHOP. Coll. Ex. Buy.

Schirmer, George F., 2912 N. 45th St., Milwaukee 10. RHOP: esp. Papilionidae, Pieridae, Nymphalidae, Morphidae, Brassolidae. Coll. Ex. Buy. Sell.

*SIEKER, WILLIAM E., 119 Monona Ave., Madison 3. RHOP. MACRO: esp. Sphingidae, Saturniidae, Citheroniidae. Coll. Ex. Buy. Sell.

*Stauffacher, Mrs. E.W., 2208 12th St., Monroe. RHOP. MACRO:esp. Saturniidae. Life History. Coll. Ex. Buy. Sell.

Was, Howard E., 3415 N. 3rd St., Milwaukee 12.

*ZIEMER, S.E., 715 Dorelle St., Kewaunee. LEPID. Coll. Ex. Buy. Sell.

WYOMING

Downey, Duke, 51 West 4th St., Sheridan. RHOP. MACRO. Life History. Coll. Ex. Buy. Sell.

*Glasgow, Clyde L., P.O. Box 24, Daniel. LEPID. Coll. Ex. Sell.

ADDITIONS

Fonquernie, Pierre, Directeur dept. des P.T.T., Hôtel des Postes, Rennes (Ille-et-Vilaine), FRANCE.

Gaillard, François, 5 Cité du Midi, Paris 18^{e}, FRANCE. RHOP. MACRO. Coll. Ex. Buy.

Stein, George L. 735 Washington St., Cumberland, Maryland, U.S.A. RHOP. MACRO. Life History, Distribution. Coll. Ex. Buy. Sell.

SUMMARY

Members 447

Library and Institution Subscribers 41

Exchanges and Gifts to Institutions 19

TOTAL RECEIVING NEWS 507

NATIONS REPRESENTED 37

VOLUME 5 — 1951 — NUMBERS 1–2

BAND 5 — HEFTE 1–2

TOME 5 — NUMÉROS 1–2

The LEPIDOPTERISTS' NEWS

Published by THE LEPIDOPTERISTS' SOCIETY
Publié par LA SOCIÉTÉ DES LÉPIDOPTÉRISTES
Herausgegeben von der GESELLSCHAFT DER LEPIDOPTEROLOGEN

IN THIS ISSUE

SPECIAL MEETING OF THE SOCIETY
in conjunction with
THE IXTH INTERNATIONAL ENTOMOLOGICAL CONGRESS
AMSTERDAM, The Netherlands
AUGUST 21st, 1951
(see page 10 for details)

SUMMARY OF PROCEEDINGS OF THE

FIRST ANNUAL MEETING OF THE LEPIDOPTERISTS' SOCIETY

The meeting was held December 29 and 30, 1950, at the American Museum of Natural History in New York City. Most of the first morning was taken up with registration and those present becoming acquainted with one another and renewing old friendships. Matters were a bit complicated by icy conditions on all the roads, so things didn't get started quite as soon as expected. In due time, however, Mr. Austin H. Clark called the meeting to order. Dr. A.B. Klots, chairman of the Local Arrangement Committee, gave a short welcoming speech. Afterwards, the group adjourned to the fifth floor of the Museum, where the Lepidoptera collection is housed. Here, under the supervision of Dr. F.H. Rindge, Dr. Klots, and Mr. C.F. dos Passos, parts of the collection were shown to interested members.

Of the 51 members present, 21 were from outside the New York - New Jersey area, from the following states and provinces: Connecticut (5); District of Columbia (2); Maine; Maryland; Massachusetts (2); Michigan (2); Missouri; Ontario (2); Pennsylvania (3); Quebec; Saskatchewan.

After lunch, Dr. C.L. Remington called the symposium on "Geographic Subspeciation in the Lepidoptera" to order. The symposium will be published in full in another issue of the News. It will suffice, therefore, merely to state that this was a most interesting and educational symposium.

A number of the members got together and had dinner at a local restaurant. Many interesting conversations and discussions took place during the meal. This was followed, back at the Museum, by the Illustrations Session. A number of excellent paintings, photographs, and exhibits from various members were exhibited. These were put on display largely through the efforts of Dr. Klots and Mr. S.A. Hessel; a vote of thanks is most certainly due these men, as well as to all others who helped, in their untiring efforts to have everything in such good shape. A number of colored slides were shown, and the highlight of the evening was the showing of films by Nicholas Shoumatoff on collecting Lepidoptera in Jamaica.

The morning session on December 30 was devoted to general papers, with Dr. Rindge presiding. The papers included the following:

1. "The Canadian North and Some of the Indigenous Butterflies", by T.N. Freeman (Read by E.G. Munroe). A brief summary of the butterfly collecting in the Canadian north, together with an exhibit of some specimens therefrom.
2. "Results of a Collecting Trip to the Sangre de Cristo Range in Colorado", by Otto Ackermann. Some interesting remarks on collecting in Colorado, together with a few specimens on exhibit.
3. "Status of Work on the Listing of Butterflies of Maryland", by John H. Fales. The present situation in regard to a listing of the butterflies in Maryland, and a plea for assistance from people who have collected in that state, in order to have the list as complete as possible.
4. "Some Notes on Michigan Microlepidoptera", by Ralph Beebe (Read by C.L. Remington). A brief summary of the status of Michigan Microlepidoptera.
5. "Observations of Connecticut Lepidoptera, with New Faunal Records", by Peter F. Bellinger and Roger W. Pease, Jr. Mimeographed lists of the new additions to the Connecticut fauna were distributed as part of this talk.
6. "Studies on Jamaican Butterflies", by Nicholas Shoumatoff. Observations on the butterfly population of Jamaica.
7. "The Family Castniidae", by Nicholas W. Gillham. A few remarks on this interesting family of moths, with an exhibit of specimens.
8. "The Relative Weights of Some Butterflies", by John H. Fales. The results of weighing a number of butterflies.
9. "Plastic Mounts for Lepidoptera", a demonstration by Otto Ackermann of the mounts and techniques used in preparing them.

Following this last paper, it was voted to hold the business meeting. In the absence of Dr. J.H. McDunnough, President pro tem., the meeting was called to order by Austin H. Clark, Senior Vice President-elect.

Upon motion duly made, seconded, and unanimously carried, Mr. Clark was elected Chairman of the meeting, pending his formal election as Senior Vice President.

Upon motion duly made, seconded, and unanimously carried, it was

RESOLVED, that the Constitution and By-Laws of The Lepidopterists' Society, as prepared and adopted by the Organization Committee and submitted to the Society in the Report of that Committee dated October 1, 1950, be and the same hereby are ratified and approved as the Constitution and By-Laws of the Society, and it was

FURTHER RESOLVED, that said Constitution and By-Laws be published by the Society and that a copy thereof be sent to each of its members.

Ballots announcing the slate of officers as pre-

ANNUAL MEETING OF THE LEPIDOPTERISTS' SOCIETY - cont.

viously proposed by the Nominating Committee had been mailed to all members of the Society prior to the meeting. The Secretary announced the results of the voting to be as follows:

Officers		Votes
President	J.H. McDunnough(Canada)	142
Senior Vice President	A.H. Clark (U.S.A.)	142
Vice President	W. Forster (Germany)	141
Vice President	K.J. Hayward (Argentina)	138
Secretary	F.H. Rindge (U.S.A.)	142
Treasurer	J.B. Ziegler (U.S.A.)	140

Members of the Executive Committee

To serve 1 year	Henri Stempffer (France)	124
	T.N. Freeman (Canada)	132
To serve 2 years	L.M. Martin (U.S.A.)	130
	N.D. Riley (Great Britain)	127
To serve 3 years	Takashi Shirozu (Japan)	122
	J.G. Franclemont (U.S.A.)	130

Whereupon the Chairman announced that same were duly elected.

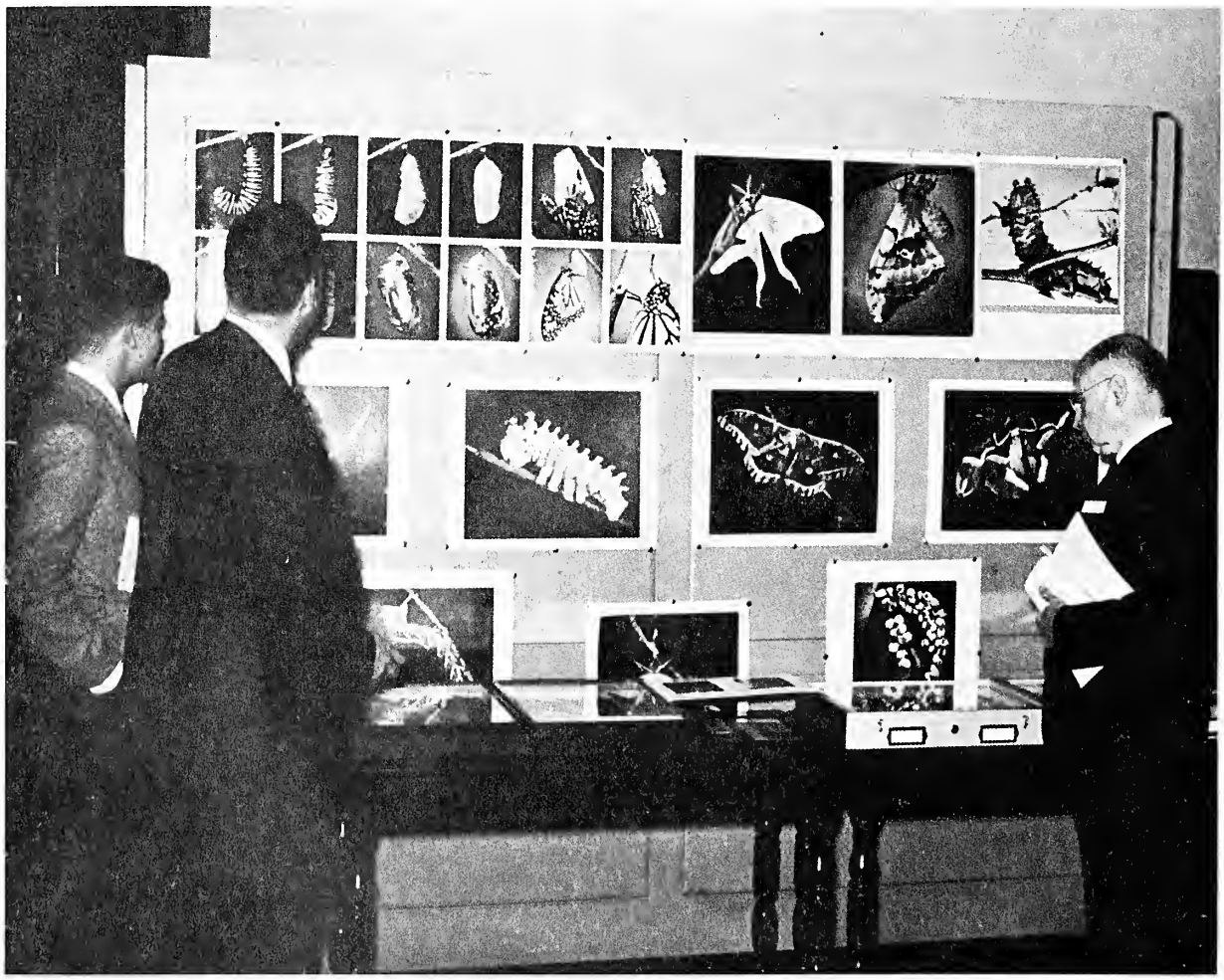


Photo by C.L. Remington

PART OF THE EXHIBITION OF PHOTOGRAPHS AND SPECIMENS

Observers are D.T. McCabe, S.A. Hessel, and C.F. dos Passos. The largest prints are by L. Quitt. Other exhibitors of photographs were: C.F. dos Passos, A.B. Klots, L. LeCharles, C.L. Remington, E.W.Teale, B.C.S. Warren. Superb paintings of life-histories by J.A. Comstock and C.M. Dammers were loaned by the Los Angeles County Museum. Colored photographs for projection were exhibited by R.H. Macy, C.L. Remington, R. E. Richard (Chairman of Illustrations), N. Shoumatoff. Specimens on display were from: O. Ackermann, C.A. Anderson, D.L. Bauer, Margaret M. Cary, D.C. Ferguson, L. Harris, Jr., S.A. Hessel, C.L. Remington.

ANNUAL MEETING OF THE LEPIDOPTERISTS' SOCIETY - concl.

Photo by C.L. Remington

GROUP PHOTOGRAPH AT FINAL SESSION

FRONT ROW: Heineman, (unidentified), Mrs. Remington, Fales, Clark, dos Passos, Grey, (unidentified).
MIDDLE ROWS: Duane, Wilcox, Adelphe, Clench, Bellinger, Ackermann (partly hidden), P.S. Remington, McAlpine (front), Ehle (rear), Klots, Pease, McCabe, Gillham.
REAR ROW: Rindge, Shoumatoff, Shappirio, Beirne, Bruggemann, Munroe, Ehrlich, Hessel.

Upon motion duly made, seconded, and unanimously carried, it was

RESOLVED, that the action of the officers pro tem. of The Lepidopterists' Society in calling this annual meeting, appointing committees, sending out ballots, etc., be and the same hereby is in all respects ratified and approved, notwithstanding the absence of strict compliance with all the terms and provisions of the Constitution.

Upon motion duly made, seconded, and unanimously carried, it was

RESOLVED, that The Lepidopterists' Society give a vote of thanks in appreciation of all the work performed by Dr. and Mrs. C.L. Remington, and Mr. H.K. Clench for the Society.

A brief discussion followed on the subject of the time of year of the next meeting. A large majority of members present expressed a preference for holding the meeting at the end of the year.

The Editor of The Lepidopterists' News was given authority to send copies of the News to institutions and libraries.

There being no other business, the meeting was adjourned.

Frederick H. Rindge, Secretary

Members and Guests Present at the Meetings

L.P. Grey
Harry K. Clench
Cyril F. dos Passos
Fred T. Naumann
Bryan P. Beirne
Eugene Munroe
Paul F. Bruggemann
David G. Shappirio
P. Sheldon Remington
Paul R. Ehrlich
Henry Fleming
Marion E. Smith
George Ehle
Nicholas Gillham
Peter F. Bellinger
Roger W. Pease, Jr.
LeRoy Wilcox
John H. Fales
W.S. McAlpine
Mr. and Mrs. Austin H. Clark
Otto H. Schroeter
Melville W. Osborne
Dr. and Mrs. C.L. Remington
C. William Beebe
Ernst Mayr
Mr. and Mrs. C.R. MacGregor
Mrs. C. Reed Cary
Otto Ackermann
Peter Boone
D.T. McCabe
S.A. Hessel
J.B. Ziegler
Fred H. Rindge
W.J. Gertsch
Alexander B. Klots
Nicholas Shoumatoff
John J. Kellner
Bro. Adelphe
Mr. and Mrs. Bernard Heineman
John W. Cadbury, III
Jane R. Van Zandt
Lincoln P. Brower
John P. Duane
Ernest L. Bell
Alice L. Hopf
Louis S. Marks
W. Donald Thomas
L.J. Sanford
Otto Buchholz
A. Glanz
G.T. Hellman

by F. Martin Brown
Colorado Springs, Colo.

Any taxonomist capable of balancing his checkbook can use simple statistical methods to improve the quality and value of his work. In this and several succeeding issues of the News I will outline some of the statistical procedures that I have found to be useful in taxonomy. At the same time I will try to explain how and when these procedures may be applied to our problems.

There are two classes of measurement commonly used in biology that lend themselves to statistical analysis: (1) linear measurements and their derived ratios; (2) frequencies. These measurements standing by themselves rarely are of importance. They tell us something about the specimens examined but little about the species or subspecies involved. What we really want to know is this: Do two series of specimens differ enough so that there is little chance that they represent extreme samples drawn from a single variable but homogeneous population? To help answer this question certain simple mathematical procedures must be applied. Perhaps the best way for me to show how this is done is to set out in each case a definite problem related to the taxonomy of butterflies.

I. Linear Measurements

THE PROBLEM: C.F. dos Passos, while studying Plebejus saepiolus, a common western Blue, noted among other things that the specimens before him from southern Utah were rather small for the species. He named this subspecies gertschi and used as one of its characteristics its small size. Now let us see if this smallness was an illusion or if gertschi really is characterized by being small.

THE SOLUTION: I took the first thirty males from each of three randomly arranged series of saepiolus in my collection and carefully measured the greatest radius of the left forewing of each specimen. Two of these series were from localities in the California mountains considered to harbor P.saepiolus saepiolus Bdv. The third series was from Navajo Mountain, Utah, where gertschi flies. Each of these series was treated statistically to arrive at certain numbers, the STANDARD DEVIATION and the PROBABLE ERROR OF THE MEAN, that can be used to estimate the chance that there is no real difference between pairs of series.

To save space and to avoid monotonous repetition I have gone into the details of the arithmetic for only one of the three series. The results of similar treatment of the other two series are included in Table 2.

Table 1 may look formidable but it is easy to build. Here are the steps that are involved.

1. The column labelled "mm." divides the range of actual measurements made into a series of uniform CLASSES, each with a range of 0.2 mm. Into the smallest class "13.0-13.1" go all of the specimens that measured either 13.0 or 13.1 mm. (theoretically this class extends from 12.95 mm. to 13.14 mm.).

2. The column headed "n" records the results of sorting the actual measurements into classes. Two specimens fell into the smallest class, one into the next, three into the next and so forth through the entire group measured. The sum of the numbers in this column is the number of specimens used (N). In this case N equals 30.

3. The next step is to find the average size of the specimens in the series. The work for this is

TABLE 1.

Treatment of the McCloud, Calif., sample of Plebejus s. saepiolus Bdv.

mm.	n	d	d^2	d^2n
13.0-13.1	2	-6	36	72
13.2-13.3	1	-5	25	25
13.4-13.5	3	-4	16	48
13.6-13.7	3	-3	9	27
13.8-13.9	2	-2	4	8
14.0-14.1	1	-1	1	1
14.2-14.3	3	0	0	0
14.4-14.5	4	+1	1	4
14.6-14.7	2	+2	4	8
14.8-14.9	4	+3	9	36
15.0-15.1	3	+4	16	48
15.2-15.3	0	+5	25	0
15.4-15.5	2	+6	36	72
15.6-15.7	0	+7	49	0
15.8-15.9	0	+8	64	0
16.0-16.1	1	+9	81	81
	N = 30			Sum = 430

Mean = 14.32 mm. v = 14.33

$p.e._m$ = 0.10 mm. σ = 3.795

S.D. = 0.76 mm.

Brown: SIMPLE STATISTICS FOR THE TAXONOMIST -cont.

not shown in Table 1. Simply add the measurements made and divide by N. The quotient is the average size, or MEAN. In this case the mean is 14.32 mm. (Note: Always carry the mean one decimal place beyond that recorded in making the measurements.)

4. Now we are ready to develop the column labelled "d". This column records "difference from the mean". To simplify the arithmetic without seriously affecting the results the differences are noted in whole numbers. It is done in the following manner. In column "d" put a 0 in the space opposite the class that contains the mean (in this case "14.2-14.3", since this class contains all measurements between 14.15 mm. and 14.34 mm.). Number consecutively each of the classes above and below the central class. To those smaller than the central class append a minus sign. (The algebraic sign of "d" is not necessary for the work we are going to do but is useful for other steps you may want to apply.)

5. The next column, "d^2" is nothing more than the square of the number in column "d" for each class.

6. The column labelled "d^2n" is made up of the products of the numbers found in columns "n" and "d^2" for each class. For our class 13.0-13.1 these are 2 and 36 respectively and the product is 72.

7. Now add the numbers in "d^2n" and divide this sum by N. In our case the sum is 430 and N is 30. Thus the quotient is 14.33. This number is the VARIANCE OF THE CLASSES and is labelled "v". (Note: If N is less than 30 use N-1 as the divisor.)

8. The square root of the variance yields the STANDARD DEVIATION OF THE CLASSES, σ. In our case this is 3.795.

9. In column "d" we allowed a full unit, 1, to represent a difference of only 0.2 mm. Thus the units in "d" are five times those we used in making our measurements. As a result of this the standard deviation of the classes is five times the size of the standard deviation of the measurements that were made. So, by dividing 3.795 by 5 we arrive at the STANDARD DEVIATION OF THE SERIES MEASURED (S.D.). This is 0.76 mm. and is one of the numbers sought. (Note: Since throughout these calculations we have used the mid-point of class "14.2-14.3" as the mean of the series instead of 14.32 mm., the true mean, there is a slight error in v and thus in σ and S.D. These errors can be corrected by methods outlined in any good book on statistics. This correction always makes S.D. smaller. By omitting the correction, which is slight, the error in our figure is on the side of a safer inference at the expense of arithmetic accuracy. With small series I generally ignore the correction EXCEPT WHEN THE CONVERSION OF σ TO S.D. REQUIRES MULTIPLICATION.

10. After one more step, we are through with Table 1. THE PROBABLE ERROR OF THE MEAN ($p.e._m$) is found by dividing the S.D. by the square root of N-1 and then multiplying the quotient by 0.6745. In our case $p.e._m$ is 0.10 mm.

Now of what use are these numbers after we have obtained them? From the S.D. we can get a much better idea of the range in size of a large series of specimens than from a simple statement of the smallest and largest specimen measured. If S.D. is multiplied by 2.58 and the resultant number is added to and subtracted from the mean of the series these numbers give the range within which 99% of all of the specimens in an infinitely long series fall. (Note: The derivation of 2.58 will be explained in a later article.) The "99% limits" is a more meaningful method of stating the range in size for a measurement.

Those specimens that fall materially more than 2.58 S.D. away from the mean should be critically examined. Going over the individuals in each of the series studied I find that none of the Californian specimens fall outside of the 99% limits for their respective samples. There is one Navajo Mountain specimen that measures 10.9 mm. This is 0.1 mm. outside of the limits for that series (Table 2). Although this specimen is mathematically suspect I defy anyone to pick out the individual by eye! In a case like this the researcher must use common sense. The very meaning of "99% limits" allows 1 per 100 to be outside the limits. I think that we can safely say there is nothing odd about the sizes of the individuals within each series. In other words, so far as size is concerned each series is homogeneous.

The next step is to see of what use is $p.e._m$. Just as the S.D. is used for comparing an individual with a whole series, $p.e._m$ is used to compare one series with another series. Table 3 is the result of the comparisons of our three samples. Following it is an explanation of how the numbers were derived and what they mean.

The first two columns are self-explanatory and obvious. The third column "probable error of difference" is easily computed. Square the $p.e._m$ for each of the two means involved, add these squares and then take the square root of the sum. This probable error is usually abbreviated p.e.d. to differentiate it from the $p.e._m$. The "t" score is arrived at by dividing the difference between the two means by its probable error $\left(\frac{m_1 - m_2}{p.e._d}\right)$. The "t" score is the important number in Table 3. (Note: The interpretation of "t" scores is somewhat influenced by sample size. To accent them as they stand is to err on the side of caution.)

The "t" score is related to the probability that the two means were derived from samples drawn from the same general population. In taxonomy, as in other fields using biometry, a "t" score of 3 or less has little or no meaning. About 1 in 12 samples drawn from a homogeneous population will show a "t" score of 3 when compared with other samples from the same population. Since in taxonomy we deal usually with very small samples of any population, I prefer to consider different only those samples

that show a "t" score of at least 6 and preferably 7. A "t" score of seven will occur about once among 500,000 samples drawn from the same population. On this basis we can say that there is no reason to feel that the difference in size observed between the samples from McCloud and Big Meadows is significant. We can also say with a high degree of confidence that the Navajo Mountain sample represents a population that is smaller than true P. saepiolus saepiolus Bdv. It is safe to say, at least on the basis of size, that gertschi dos Passos is a valid subspecies of P. saepiolus.

TABLE 2

Parameters of three samples of P. saepiolus

	McCloud, Calif.	Big Meadows, Calif.	Navajo Mt., Utah
N =	30	30	30
mean	14.32 mm.	13.90 mm.	12.37 mm.
$p.e._m$	0.10 mm.	0.13 mm.	0.07 mm.
S.D.	0.76 mm.	1.00 mm.	0.53 mm.
99% limits	12.36-16.28 mm.	11.32-16.48 mm.	11.00-13.74 mm.

TABLE 3

Comparison of the series

series compared	difference between means	probable error of difference	"t" score of difference
McCloud-Big Meadows	0.42 mm.	0.16	2.6
McCloud-Navajo Mt.	1.95 mm.	0.12	16
Big Meadows-Navajo Mt.	1.53 mm.	0.15	10

CARBON TETRACHLORIDE IS DANGEROUS

The use of carbon tetrachloride to show wing venation and as a killing agent was suggested in the Lep. News [vol.4: pp.70 and 73]. In the September, 1950, issue of Consumers' Research Bulletin there is warning of the dangerous nature of this fluid, with mention of four cases of death from its use reported from Westchester County, New York, in a six weeks' period ending April 21, 1950. "Medical experts recommend that all products containing carbon tetrachloride be clearly labeled, no matter how small the amount present, pointing out that one teaspoonful taken internally may be fatal and the fumes from one cupful in a poorly ventilated place may cause death."

Entomologists often work in small or poorly ventilated rooms, and in studying wing venation would have their faces near or directly over the specimens being examined. The moral is obvious.

Hugh B. Leech
San Francisco, Calif.

CORRECTION ON HÜBNER'S FLORIDA

In the Lepidopterists' News [vol.4: p.62; 1950] there is a short article entitled "Hübner's Florida" by Austin H. Clark. In it there is a misquotation of Hübner. If one will consult the first three "Hundert" [volumes] of the Zutrāge, he will find the following cited localities, which have reference to the area discussed by Clark. "Aus Florida", "Aus Georgien in Florida", "Aus Neugeorgien", and "Georgien in Nordamerika". Nowhere is there a reference to "Florida in Georgia". Harris in his revised Butterflies of Georgia, introduction, page v, also makes reference to "Florida in Georgia", undoubtedly based upon Clark. In the Sammlung there is one reference to a North American locality in the text, that is "Pennsylvania" on page 32; some of the plates bear localities in addition to the names, but none such as "Florida in Georgia". Hemming cites localities from the Hübner manuscripts, but still none are as cited by Clark; I am convinced he meant "Georgien in Florida".

John G. Franclemont
Washington, D.C.

FIELD NOTES ON THE BUTTERFLIES OF KNOB LAKE, NORTHERN QUEBEC[1]

by Eugene Munroe[2]
Systematic Entomology, Division of Entomology
Ottawa, Canada

In 1948, as was reported in the Season Summary for that year, I spent some six weeks in the Knob Lake district of northern Quebec. My trip formed part of the Northern Insect Survey, and was sponsored by the Division of Entomology, Canada Department of Agriculture, and by the Defence Research Board, Canada Department of National Defence. In addition, the most valuable help was provided by the Labrador Mining and Exploration Company, which arranged for accommodations and other facilities at its camp at Burnt Creek, near Knob Lake. One of the objectives of the trip was to investigate the general insect fauna of the region, including as an important element the Lepidoptera.

The Knob Lake district lies well in the interior of the Labrador Peninsula, at about 55° N., 67° W. This place is very nearly on the Quebec-Newfoundland interprovincial boundary, and is about equidistant from Fort Chimo on Ungava Bay, Goose Bay in Labrador, and Seven Islands on the St. Lawrence. The region is now the site of the well-known iron-mining development, which in 1948 was in a relatively early stage. The insect fauna of the interior of northern Quebec and Labrador had not previously been investigated, and consequently the findings were of considerable interest.

Physically, the region is of moderately high altitude and rolling topography. Actual elevations in the localities that I visited varied from about 1700 to 3000 feet. The underlying rocks are sedimentary, in contrast with the igneous rocks that occupy so large a part of northern Quebec. The tilted and folded strata are reflected in the long, straight, parallel series of ridges and valleys that are so evident on any map of the region. The country shows every sign of having been recently glaciated: the hilltops are bare and scarred by rocky cirques; the soil of the slopes is shallow and is usually pure sand or gravel, covered by a surface mat of moss and lichen. Only in the hollows is there any accumulation of peat, and this reaches an appreciable depth only in the lower valleys, where large bogs have begun to develop. The climate is cool and very humid. Although 1948 was an unusually dry summer, only two or three days during my stay were uniformly sunny, and only on these did the temperature go above 70°F. A normal July day is cloudy, with occasional brief sunny intervals, and with scattered, short, cold showers. The maximum temperature may be in the neighbourhood of 60 or 65°F. High winds are common.

Ecologically, the district belongs to the Northern Transition Zone. The hilltops support a tundra-like vegetation, for the most part only a few inches high, and the valley bottoms have a moderately dense growth of coniferous trees. The intermediate slopes have rather sparse stands of conifers in the more sheltered areas, alternating with open areas of lichen studded with dwarf birch, Vaccinium, Ledum, and Kalmia. The upper limit of standing trees is at about 2400 feet, but prostrate conifers occur singly at altitudes up to 2700 feet. In addition to the dry habitats already mentioned, there are numerous moist ones in which the vegetation is somewhat different. In the valleys of temporary or permanent streams there are often stands of two or three species of shrubby willows; one species reaches a height of five or six feet, the others are considerably smaller. Small lakes and large ponds are numerous. Many of these are temporary; after they dry up, meadows of bright green grass rapidly appear in their beds. Floating sphagnum bogs are rare, but occur sometimes around small lakes. In the lowest valleys there are considerable areas of swamp underlain by solid peat. Lakes are numerous everywhere. To the south of the area in which I stayed, the country descends into the broad Hamilton River basin, and its character changes entirely, most of the area being occupied by lakes or floating bog.

Because of the persistence of cool, wet weather in the spring, and its early reappearance in the autumn, the season in which Lepidoptera fly is very short. No butterflies appeared before July 5, and none was seen after July 30. It is unlikely that they survive after the first half of August, during which the weather is already becoming cold and unfavourable. As is usual in extremely humid climates, butterflies take wing readily at the least indication of sunshine, and continue to fly, although in reduced numbers, even in overcast weather, provided it is not too cold and there is no rain. The butterflies, and indeed all the insects of the region, are characterized by strong, rapid flight and great wariness. Species that were captured without trouble at Seven Islands, 300 miles to the south, were taken only with great difficulty at Knob Lake. A separate plan of campaign had to be devised for each species of butterfly, if reasonably long series were to be obtained.

The butterfly fauna is characterized by great poverty. In spite of careful search, I collected or saw only ten species. None of these has an endemic subspecies in the region. In the three species in which a distinction can be made at this time, the Knob Lake population resembles that of the coast of Labrador rather than that of the Gulf of St. Lawrence. The small number of species is no doubt partly to be explained by the relatively recent retreat of the ice from this region. Probably more important, however, is the unusual nature of the habitat. On the one hand, the unfavourable climate undoubtedly hinders the establishment of species of

---

[1]Contribution No.2788, Div. of Entomology, Science Service, Dept. of Agriculture, Ottawa, Canada.

[2]Agricultural Research Officer.

the coniferous forest zone; on the other, the areas suitable for barren land species are small, and do not support a varied fauna.

Owing to the short flight season, differences in the time of appearance of different species are very slight. There appears, however, to be a regular seasonal succession, although it is measured in days, rather than in weeks as in more temperate climates. The first butterflies that were seen were Boloria polaris and Pyrgus centaureae, on July 5. Oeneis melissa was seen on July 6, but did not become numerous until later. Boloria chariclea and aphirape appeared rather suddenly on July 8 and 9; B. chariclea was already becoming worn and ragged by July 13. The first individuals of Colias pelidne did not appear until July 9 and 10; this species was seen only singly until July 12, and reached its peak of abundance on July 20. Hesperia borealis was first seen on July 17. The remaining species were so local, scarce, or inconspicuous that the dates on which they were captured are probably not an accurate index of their true flight periods. The last butterflies seen were Boloria aphirape and B. selene, taken at 2200 feet on July 30. Butterflies of any kind were seen on only fifteen different days. This must represent almost the total flying season for the year.

More striking than the seasonal succession of the species was their altitudinal zonation. The range of altitudes investigated is a critical one, as it includes the tree line at about 2400 feet. Three species, Boloria polaris, Oeneis melissa, and Plebeius aquilo, were at home only above tree line. Of these, B. polaris was common from 2400 to 2700 feet; P. aquilo was seen only on bare tundra at about 2700 feet, and O. melissa was encountered only on rocky hilltops at 2800 feet. Colias pelidne ranged freely everywhere above and below tree line except on the highest hilltops. Boloria chariclea was abundant everywhere below tree line; it occasionally strayed above tree line, but was not nearly so numerous there. Pyrgus centaureae had a similar distribution. Boloria aphirape did not go quite so high as B. chariclea, and was confined chiefly to sheltered valleys and ravines. Hesperia borealis was found only on the grassy beds of dried-up lakes at from 2200 to 2400 feet, but doubtless occurs also in suitable localities at lesser elevations. Boloria selene and Plebeius scudderi were found only in a damp place at about 2200 feet, on a long slope facing eastward into a broad, low valley.

Detailed notes on the various species follow. I am indebted to my colleague, Dr. T.N. Freeman, for making the determinations, which he asks me to consider as tentative until the northern butterflies are more thoroughly studied.

Boloria selene atrocostalis Huard. This was the sole southern species encountered. It was found in only a single locality, a marshy hillside at about 2200 feet. The first specimens were taken on July 27, but on this date they were already badly worn, and must have been flying for some days before they were discovered. The specimens were not particularly active, and were easily captured.

Boloria aphirape triclaris Hbn. This species was moderately abundant, although somewhat local. It was most frequently encountered in sheltered valleys, at altitudes up to about 2300 feet. It flew rapidly at about waist height, in and out among dwarf willows and birches, rarely settling. The first specimens were seen on July 9 and one was seen as late as July 30.

Boloria chariclea boisduvalii Dup. This was the most numerous and generally distributed of the genus. It was common everywhere up to tree line, and single specimens were not infrequently seen above. The flight was rapid and erratic, but in sunny weather the butterflies would often settle on moist sand to drink, and could then be easily approached and caught. The first specimens were seen on July 8; by July 13 the butterflies were becoming somewhat worn; the species continued to fly in some numbers until July 29, although during the latter part of the month they were for the most part in very poor condition. A female was seen ovipositing on Vaccinium sp.

Boloria polaris groenlandica Skin. Unlike the other species of Boloria, B. polaris did not occur normally below tree line. Its favourite habitat was the bare, wind-swept tops of the higher hills and ridges. There the butterflies, both males and females, appeared in considerable numbers. They were most often seen in the lee of low sedimentary ridges on the flat hilltops, usually congregating behind certain favoured ridges; the selection varied from day to day, probably with changing wind conditions. Individual butterflies were most frequently seen flying slowly and with evident effort directly into the strong wind. As they approached the crest of the ridge and encountered an increasing wind velocity, the butterflies would either turn and shoot off downwind, to come back and repeat the performance, or else settle on the spot and bask in the sun with wings outspread. By following the butterfly upwind, one therefore had a chance either of netting it while it was on the ground or of taking it in flight as it sailed downwind. If a butterfly was alarmed it immediately turned and went downwind, returning to the ridge many yards away. B. polaris was much more rapid in flight and also much more wary than the other species of the genus.

Oeneis melissa assimilis Butl. This species was numerous, but was restricted in habitat and required careful stalking; consequently only a few specimens were taken. It was seen only on the highest summits of the district. These were isolated, boulder-strewn peaks crowning the higher ridges, with an average altitude of about 2800 feet. The first specimen was seen on July 6, and was the only one encountered in four successive days of collecting at the higher levels. These were not revisited thereafter until July 20, and on that date and July 22 Oeneis were abundant. They were invariably seen at the very summit of a peak, rarely settling more than a few feet below the highest point. In this situation the ground was always studded with large, lichen-covered, quartzite boulders, and on these the Oeneis normally settled. The resting position was very characteristic, the wings always being held tightly closed, while the insect usually sat tilted at a considerable an-

gle to one side or the other. The butterflies were very hard to see in this position, and were also most alert, so that they could be approached only with the greatest caution. If alarmed, they immediately flew horizontally downwind, so that they were almost instantly carried to safety many yards above the lee slope of the hill. A cautious approach, preferably under cover of a boulder, allowed a single stroke of the net, which was occasionally successful.

Plebeius aquilo aquilo Bdv. This species was encountered in only one place, on a broad sloping expanse of caribou "moss" at about 2700 feet. Even at this locality it was scarce. It was also most inconspicuous, the small size and dull colouring making it hard to follow. The flight was unusual, being rapid and buzzing, making the insect look more like a small noctuid moth than a butterfly. The butterflies rarely rose more than a few inches above the ground, and rested fairly often, with the wings tightly closed. The species was seen only on July 20 and 22, but the period of flight is undoubtedly longer.

Plebeius scudderi aster Edw.(?) What was almost certainly this form was seen, but not taken, on July 27 at a single locality. This was at an elevation of 2200 feet and was the same place at which Boloria selene was caught on two occasions. The butterflies were moderately common, and were settling on a gravel road to drink. They rested with wings closed, but, because of their wariness and small size, were very hard to net. The flight was not strong, but was erratic. The insects were inconspicuous and rarely rose more than a few inches above the ground, and in consequence could be followed with the eye for only a few seconds. I later learned that the species was not uncommon in the swampy territory at the lower altitudes, but was unable to find any after the day on which I first saw it.

Colias pelidne labradoriensis Scud. Although this species first appeared in small numbers on July 9, it continued to increase in abundance, and eventually became one of the most numerous. Males were much more often seen than females, and, like those of other species of the genus, they congregated in numbers around mud puddles. The females did not have this habit, but rather flew freely across country, often settling on dwarf Vaccinium bushes; none was seen to oviposit. The resemblance in appearance and habits to C. interior was striking. I saw the latter species at Seven Islands on my way back from Knob Lake, so that I was able to make the comparison while C. pelidne was still fresh in my memory. There was much variation in pattern among the specimens taken at Knob Lake, but there was no evidence from either habits or distribution that they represented more than one species.

Pyrgus centaureae freija Warr. This butterfly was fairly common up to tree line in the earlier part of the month. Its behaviour was much like that of other species of the genus. The flight was moderately strong, and the butterflies frequently settled to suck moisture from wet places on the ground. They were most often seen near small, willow-bordered streams in the treed zone. Most specimens were taken between July 5 and 10, but one was caught as late as July 26.

Hesperia borealis Linds. This species was seen only on the meadows of bright green grass that marked the beds of temporary ponds and lakes in sheltered valleys below tree line. The butterflies had flight and resting habits typical of the group. They were most active and wary, but often settled on blades of grass, where with some care they could be captured.

More precise notes on the taxonomy and variation of the various species will appear at a later date, when the full results of the Northern Insect Survey are prepared for publication. Meanwhile, I hope to contribute in the near future some supplementary field notes on the moths of the Knob Lake region.

TYPE SPECIMENS IN THE PARIS MUSEUM

As a result of a meeting of the staff of the Department of Entomology of the Paris Museum (Muséum National d'Histoire Naturelle), it was decided that the primary type specimens belonging to the Museum were not to leave the Department. Theoretically, it had been so for a good many years, but the types were, till now, easily borrowed. From now on, these will have to be studied in the Department. It is already the rigid policy in most other important museums. Paratypes will continue to be loaned to proper authorities.

As far as the Lepidoptera are concerned, I began, about a year ago, to search out the types in the different collections, to classify, file, and catalogue them. Already some lists have been published and others are in press. In this sphere, the Paris Museum finds itself very much behind most of the important museums, which started this work about fifty years ago.

Pierre E.L. Viette
Paris, France

MARKING NORTH AMERICAN LEPIDOPTERA

Several individuals in North America planning to mark Lepidoptera for flight studies have maintained contact with the News editors regarding special marking systems they use. It is vital that some liaison exist so that no two individuals will use the same mark and thus vitiate the certainty of identifying marked specimens picked up in the field. The use of combinations of numbers or letters rubber-stamped on the wings seems to be best for Danaus; bright, rapidly drying lacquer-paints are perhaps best for other species. Lepidopterists in localities where large-scale marking of Monarchs (D. plexippus) is possible may wish to correspond with me on techniques and marks.

C.L. Remington

Notice has been received from the Secretary that at the request of the President a Special Meeting of the Lepidopterists' Society has been called in conjunction with the IXth International Congress in the Netherlands. The meeting has been called for August 21st, 1951. Dr. Walter Forster, Vice President of the Society, has been designated to preside in the absence of the President. Dr. A. Diakonoff is Chairman of the Organizing Committee. The meeting will be held for the purpose of presenting a discussion of special interest to lepidopterists (see below).

Dr. Diakonoff has discussed the plans for the Special Meeting with Prof. D.J. Kuenen, President of the Congress, and received his full support. The Congress will open Friday, August 17th, and close the following Friday. Our meeting will be held in the Congress building on Tuesday, August 21st, at 20 o'clock (8:00 P.M.). It will be held through our own initiative and independently of the Congress, but the President of the Congress preferred to put it on the general program of the meetings. Dr. Diakonoff accepted his proposal to give free access to the meeting to every member of the Congress who might be interested.

Prof. W.K.J. Roepke and Mr. B.J. Lempke have been invited to be members of the Organizing Committee with Dr. Diakonoff. The Committee will secure all necessary local arrangements.

The Chairman of the meeting, Dr. Forster, has invited a panel of specialists to present a symposium on the subject "THE PHYLOGENY AND CLASSIFICATION OF THE LEPIDOPTERA". The speakers will be from several European countries and have been working and publishing on the subject. The panel will not be announced until Dr. Forster has received acceptances from all of the prospective speakers.

The present need to hold the Annual Meetings in North America makes this Special Meeting an exceptionally welcome opportunity to develop the international nature of the Society. Very many of our European members and a few from North America and perhaps elsewhere will be present at the Congress and will be able to attend the Special Meeting with its timely and controversial subject. Efforts are being made to secure for publication at least the essence of the symposium so that it will be available for permanent reference.

C.L. Remington

RESEARCH REQUEST

Harry K. Clench and I are preparing a study of all the Strymon falacer, calanus, godarti forms. For this we need every possible specimen from the South and from Ohio westward, and especially from the far South and the West. All borrowed material will be returned promptly upon completion of the work, determined; and due acknowledgement will be rendered cooperators in publication. Alexander B. Klots, American Museum of Natural History, 79th St. and Central Park West, New York, 24, N.Y.

N.D. RILEY has been elected President of the Royal Entomological Society of London for the Session 1951-52. [At the Lepidopterists' Society meeting in New York, December 30th, Mr. Riley was elected a member of the Executive Committee for 1951 and 1952.]

RAMON AGENJO, of the Instituto Español de Entomología, has recently been awarded the high "Alonso de Herrera" prize by the Spanish "Consejo Superior de Investigaciones Científicas" for his memoir "Faunula Lepidopterológica Almeriense". The memoir has not yet been published but will appear some time in the future.

His "Catálogo Ordenador de los Lepidopteros de España" has now been completed. It can be obtained reasonably by ordering Vol.IV, nos.3-6 and Vol.V, nos.1-3 of Graellsia from:

Consejo Superior de Investigaciones Científicas
Medinaceli, 4, Madrid, SPAIN

Dr. A. DIAKONOFF, whose departure from Java was announced previously (Lep. News 4: p.69; 1950) has been appointed Keeper of Lepidoptera at the Rijksmuseum Van Natuurlijke Historie, Leiden, The Netherlands. This will allow him to continue his distinguished studies of the Microlepidoptera of South Asia. He will also continue abstracting for the Lep. News all papers on Lepidoptera published in The Netherlands and Indonesia. Dr. Diakonoff is serving as Chairman of the Organizing Committee for the Special Meeting of the Lepidopterists' Society being held in conjunction with the IXth International Entomological Congress.

G.D. HALE CARPENTER, Hope Professor Emeritus at Oxford University, has just completed a revision of the Danaidae genus Euploea. He has been working on this group for many years and has examined well over 8000 specimens, from all available sources. The appearance of Prof. Carpenter's exhaustive analysis of this wonderful genus will be a notable event for lepidopterists.

PAUL F. BRUGGEMANN, formerly of Saskatchewan and now a member of the Northern Insect Survey of the Canadian government, left March 26th to spend the "summer" of 1951 on the extreme northeastern corner of Ellesmere Island, near the spot where the "Alert" of the Nares Expedition wintered in 1875-76. He hopes to duplicate and add to Fielden's records. He promised an account of his arctic experiences for the Lep. News after his return in the fall.

Dr. H.E. HINTON, late of the British Museum staff and now a member of the Department of Zoology, University of Bristol, England, has been working for some years on a book on the biology of the Lepidoptera, with emphasis on physiology and morphology. Best known as a coleopterist, Dr. Hinton has recently worked extensively with larvae and pupae of Lepidoptera and has proposed a modified phylogeny of the order(see review in Lep.News, vol.1: pp.33-34; 1947).

C.L.R.

HAROLD I. O'BYRNE (1898-1951)

Harold O'Byrne, formerly of Webster Groves, Missouri, and for many years an ardent student of the Lepidoptera, died suddenly at his home in Iberia, Missouri, 22 January 1951.

Harold Irvin O'Byrne, son of James W. and Lula (De Groff) O'Byrne, was born in St. Louis, Missouri, 21 April 1898. His interest in nature study was fostered early in life by his father who supplied him with a net and encouraged him to collect butterflies in Forest Park. His early educational career was interrupted, however, when, at the age of 18 years, he was called to serve with the Missouri National Guard on the Mexican border in 1916. With the entrance of the United States in World War I in 1917, he was again called to duty and served in the 138th Infantry Regiment of the 35th Division overseas until the end of the war. Although much of this time was spent in the trenches in France, he nevertheless found opportunities to capture an occasional butterfly which he sent home for his future collection.

Upon his discharge from the Army he returned to Missouri where he made his home for a time with his mother in St. Louis and later in Webster Groves. All leisure time of the succeeding years was thereafter devoted to studying the butterflies and moths of this area and to building up a collection of these insects. Upon the removal of the family in 1927 to Webster Groves, he was introduced to the Webster Groves Nature Study Society, where he found many persons having like interests. Chief among these were A.F. Satterthwait, in charge of the United States Bureau of Entomology laboratory in Webster Groves, and Phil Rau of Kirkwood (Lep. News 2: p.62; 1948), who was particularly interested in ecology and insect behavior, especially of the Hymenoptera. Rau did much to encourage O'Byrne to make a careful study of his specimens, not only in the laboratory, but primarily in the field. The encouragement which he received from these sources is especially reflected in the articles which appeared from his pen and was the prime motive in inducing him to make natural history his life's work.

O'Byrne attended the University of Illinois 1936-39, at the end of which time he received his A.B. degree with a major in entomology. During this time he did part time work with the U.S. Bureau of Entomology and Plant Quarantine in Urbana, Illinois, as scientific aide in Corn Earworm and Sunflower Seed Weevil investigations. During the summer of 1939 he was stationed in Danbury, Connecticut, with the Dutch Elm Disease control, and in 1940 in Gulfport, Mississippi, as an inspector in White Fringed Beetle control.

In 1942 he was appointed naturalist at Rockwoods Reservation near Glencoe, Missouri, a project of the Missouri Conservation Commission, which position he held until 1948. During this time he lectured to public school children of the St. Louis area, to Boy Scouts and Girl Scouts and to various adult groups, such as garden clubs, civic and church organizations, nature clubs, etc., and also conducted nature tours through the reservation. He also taught a short course in natural history at Washington University, both in the classroom and in the field.

In 1948 O'Byrne was appointed Professor of Biology in Conservation College (formerly Iberia Junior College) at Iberia, Missouri, and during the last year also fulfilled the office of Dean of the College. Here he taught general zoology, botany, entomology, and general conservation of wildlife and at the same time conducted a course in insect pest control to an adult class during the evenings. During 1950 he taught an extension course in Nature Study at Iberia for Central Missouri State College of Warrensburg.

O'Byrne was an active member of the Webster Groves Nature Study Society since 1927 and served at various times as president, editor of its bulletin, and chairman of the entomology section. He was a member of the St. Louis Entomological Club from 1928 until its disbandment in 1934 and always took an active interest in its affairs, frequently reading papers on his observations and experiments with insects. He was also a member of the Academy of Science of St. Louis and for a time chairman of the Entomology Section. He was a charter and sustaining member of The Lepidopterists' Society. Other organizations to which he belonged were the Missouri Academy of Science, American Association for the Advancement of Science, Entomological Society of America, American Association of Economic Entomologists, and The American Nature Study Society of which he also served as secretary-treasurer.

O'Byrne's interest was primarily in the ecology and behavior of insects, as may be seen in the titles of his bibliography. He made many observations on the migrations of butterflies and the relationship of the color of flowers to the visits of their insect guests. Many of these observations still remain unpublished, some in manuscript form, but most of it in unworked notes filling dozens of note-books. He had built up a considerable collection of Lepidoptera, mostly North American, which he freely used in his class-room and field lectures.

Harold O'Byrne married, in 1936, Miss Olive Schregardus of Webster Groves. They had a son and daughter who, together with the widow, survive him.

BIBLIOGRAPHY OF HAROLD I. O'BYRNE

1930. The Night Flight of Diurnal Butterflies. Ent. News 41: 20.
1931. A Recent Occurrence of Catopsilia philea in Missouri. Ent. News 42: 15.
1931. A List of the Butterflies of St. Louis County, with Synonomy. Webster Groves Nature Study Soc. Bull. 2.
1932. A Melanic Female of Colias eurytheme. Ent. News 43: 15-16.
1932. A Female Intermediate Between Papilio glaucus and Its Form turnus. Psyche 39: 35.
1932. The Migration and Breeding of Dione vanillae in Missouri. Ent. News 43: 97-99.
1932. November Observations on Pieris protodice vernalis in Missouri. Psyche 39: 85.
1932. Notes on Butterfly Migration. Bull. Brooklyn Ent. Soc. 27: 185-188.
1932. A Moth Seized by a Bird and Rejected Unharmed. Can. Ent. 44: 239. (Reprinted in Proc. Ent. Soc. London 7: 83; 1933).
1932. On the Activity of Butterflies at Night. Ent. News 43: 207-209.
1933. On the Effectiveness of Protective Adaptions. Ent. News 44: 57-61.
1933. An Attack on a Cicada by Polistes rubiginosus. Can. Ent. 65: 129.
1933. A Migratory Flight of Catopsilia eubule. Psyche 40: 131-136.
1934. Papilio troilus Attacked by Polistes rubiginosus while Mating. Bull.Brooklyn Ent.Soc.29:73.
1934. Vespula germanica Attacks a Living Eacles imperialis. Ent. News 45: 101-102.
1934. Strymon ontario in Missouri. Ent. News 45: 212.
1934. Observations on the Life History of the 'Baltimore Checkerspot' Butterfly, Euphydryas phaeton, in Missouri. Trans. Acad. Sci. St. Louis 28: 227-230.
1935. Pogocolon gaursa Breeding in Missouri. Ent. News 46: 160.
1937. Gregarious Caterpillars. Proc. Missouri Acad. Sci. 3: 103-108.
1938. An Unusual Nesting Site of Polistes rubiginosus. Ent. News 49: 288.
1939. Notes on Butterfly Migrations. II. Bull. Brooklyn Ent. Soc. 34: 252-254.
1941. A Revised List of the Butterflies of St. Louis County, Missouri; With a Butterfly Calendar. Webster Groves Nature Study Soc. Bull. 3.
1941. Some Noteworthy Missouri Butterflies: Papilio troilus ab. radiatus and a Variation of Lycaenopsis pseudargiolus. Bull. Brooklyn Ent. Soc. 36: 124.
1941. The Hibernation in Missouri of Zerene caesonia and Euptoieta claudia. Ent. News 52: 181.
1948. Phyciodes Behavior in Missouri. Lep.News 2: 22.

Edwin P. Meiners
St. Louis, Mo.

A REARING HOUSE FOR LEPIDOPTERA

by William H. Evans
Sun Valley, California

I have been so successful in raising many species of Lepidoptera in my rearing house, that other collectors may be interested in the construction of this inexpensive insectary. It, by the way, is designated by my non-lepidopterist friends "The Bug Hotel", where all guests are provided with separate suites and are served the menus of their choice. So that larvae and pupae would not be over-heated during the summer, a site was chosen in the shade of the native ash trees in the front yard. Rock walls on two sides, stone steps on another, and a small cement drainage channel in front limited the floor-size of the structure to 6' x 5'8".

The framework of 2 x 4's is fastened down by bolts set in the cement foundation. The back is covered completely with redwood siding, and the lower 50 inches of the sides and front, except for the screen door entrance, are also boarded up. Above this is 27 inches of screen-wire topped by more siding which extends to the roof. The sloping roof, which is 7 1/2 feet above the cement floor at the front, and six inches lower at the rear, consists of sixteen 3/4 x 6" planks covered with composition roofing paper. Inside, a number of shelves, which hold numerous small rearing containers, are attached to three of the walls. Small partitions of screen-wire divide the space between two rear shelves into five breeding cages which have small screen doors hinged at the bottom so as to open downward. In order to allow plenty of room to step through the doorway, there are no shelves on the north wall. Instead, a series of small wooden rearing compartments with sliding glass fronts are fastened against the screen wire and on top of the horizontal 2 x 4 to which the lower edge of the wire is tacked.

An inexpensive enclosure such as this is very suitable for rearing in this region and in others where the temperature never drops below 20° F. Here, at an elevation of 1200 feet in the Verdugo Mountains in Los Angeles County, California, the larvae and pupae in the rearing house survived the unusually cold winters of 1949 and 1950. With a few changes a similar structure could be adapted to the climatic conditions of other areas.

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped eventually that our coverage of the world literature will be virtually complete. It is intended that every paper published since 31 December 1946 will be included. In the first four volumes of the Lep. News 1437 were listed. Abstracts give all new subspecies and higher categories with generotypes and type localities. Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members and the many regularly received are gratefully acknowledged. Initials of cooperating abstractors are as follows: [P.B.] - P.F. Bellinger; [A.D.] - A. Diakonoff; [L.G.] - L.A. Gozmány; [G.dL.] - G. de Lattin; [C.R.] - C.L. Remington; [T.S.] - T. Shirōzu. A complete set of these pages, for clipping and filing, may be obtained for Vol.4 for $0.50, and a subscription for Vol.5 for $0.50.

1. Albers, Th., "Die Boarmia repandata-Gruppe (Lep. Geom.). Beiträge zur Kenntnis der Gattung Boarmia Tr. III" [In German]. Mitt. Münch. Ent. Ges., vol.35/39: pp.241-283, pls.4-5, 17 figs. 1 Aug.1949. A very detailed revision of this group belonging to the subgenus Alcis Hb. Figures most of the palearctic species and their ♂ genitalia. Discusses range of group. Describes as new: B. admissaria race kukunorensis(Kuku-nor); B.depravata race turanica(Tura, Transcaspia);B.subrepandata races pallida(Mus-tag-ata, Yarkend) and diffluens(Muskulak, Western Pamir); and B. diffusaria (Bashahr, no.India). Two new aberrations named. B.xenica Whli.is good species. [G.dL.]
2. Andersen, F. Søgaard, "Foreløbige biologiske iagttagelser af klistermøllet (Endrosis sarcitrella(L.) [In Danish.]. (Denmark) Statens Skadedyrlaboratorium Årsberetning 1948-49: pp.21-24. 1949. Technique notes on mass rearing in lab. of E. sarcitrella (Oecophoridae). [C.R.]
3. Bank, G., "De kwikdamplamp als lokmiddel voor insecten" [In Dutch]. Ent. Berichten, vol.12: pp.433-444. 1 Nov. 1949. Notes on mercury vapor lamp for attracting moths. [P.B.]
4. Barth, Rudolf, "Vergleichende morphologische Studien über die Duftschuppen der Pieriden Pieris brassicae und Pieris rapae und der Satyrine Coenonympha pamphilus" [In German]. Zool. Jahrb., Abt. Anat., vol.70: pp.397-426, 31 figs. 30 Aug. 1949.
5. Bovey, P., "Determinisme genètique des formes orange chez Zygaena ephialtes" [In French]. Arch. Julius Klaus-Stiftung, vol.23: pp.499-503. 28 Feb. 1949. Case of incomplete dominance between genes for red and for yellow wing color; orange forms are heterozygotes. [P.B.]
6. Daniel, F., "Die Cossiden und Hepialiden der Ausbeute Höne (Lep.,Het.)(Nachtrag)" [In German]. Mitt. Münch. Ent. Ges., vol.35/39: pp.226-230, pl.1. 1 Aug. 1949. Additions and corrections to the author's paper of 1940 (l.c., vol.30, p.1004 ff). The species kulingi, formerly attributed to Phassus, belongs to Hepialiscus; Phassus sinensis is a good species, not a ssp. of signifera; Hepialiscus altissima Daniel is merely a synonym of Hepialus armoricanus Obth. [G.dL.]
7. Daniel, F., "Neue Sphingidae Südamerikas (Lep. Het.)" [In German]. Mitt. Münch. Ent. Ges., vol.35/39: pp. 230-234, pls.2-3. 1 Aug.1949. Describes as new: Protoparce florestan ssp. argentinica (Tucumán, Argentina); Protoparce grandis (Rio Grande do Sul, Brasil); Protoparce incisa ssp. pallidula (Vulcan Colima, Mexico); Perigonia pallida ssp. rufescens (Matto Grosso, Brasil); and Pholus obliquus ssp. orientis (Blumenau, S. Catharina, Brasil). [G.dL.]
8. Daniel, F., "Neue palãarktische Heterocera (Lep.)" [In German]. Mitt. Münch. Ent. Ges., vol.35/39: pp. 235-241, pls.8-9. 1 Aug. 1949. Describes as new: Lacydes semiramis ssp. brandti (Persia); Hypopta vaulogeri ssp. blanca (Bender Tschabahar, Baloutchistan, Persia); Chilena laristana (Sardze, Laristan, Persia); Holcocerus reticuliferus (Buchara), H. brunneogrisea (Thian-Shan), H. baloutschistanensis (Bender Tschabahar, Baloutchistan); H. senganensis (Fort Sengan, Baloutchistan); and Hepialus carna ssp. transsylvanica (Cibins Mts., Transsylvania). [G.dL.]
9. Downes, J.A., "Some Lepidoptera of Western Scotland." Ent. Mo. Mag.,vol.84: pp.203-204. Sept.1948.
10. Fischer, Ch., "Lythria purpuraria Linné et purpurata Linné" [In French]. Bull. Soc. Ent. Mulhouse, 1949: pp.73-79, 1 pl. 1 Nov. 1949.
11. Florkin, Marcel, Franz Lozet, Henri Sarlet, "Sur la digestion de la cire d'Abeille par le larve de 'Galleria mellonella Linn.' et sur l'utilisation de la cire par une bactérie isolée à partir du contenu intestinal de cette larve" [In French]. Arch. Internat. Physiol., vol.17: pp.71-88, 3 figs. Oct. 1949. The larva of the Wax Moth itself digests some parts of the beeswax; other parts are utilized by a bacterium found in the gut, and may be secondarily available to the larvae. [P.B.]
12. Franclemont, John G., "On the Types of Two Genera in the Lepidoptera(Arctiidae and Drepanidae)." Entomologist, vol.83:pp.199-200. Sept.1950. Callimorpha, type dominula; Drepana, type falcataria. [P.B.]
13. Freeman, H.A., "Notes on Megathymus, with Description of a New Species." Field and Laboratory, vol. 18: pp.144-146. 11 Dec. 1950. Describes as new M. evansi (Cochise Co., Ariz.). It is apparently a "sibling species" with M. neumoegeni and has been confused with it. The two are sympatric but have differences of habit as well as pattern and genitalia. No figures given! [C.R.]
14. Freeman, H.A., "Notes on the Agave Feeders of the Genus Megathymus." Field and Laboratory, vol.19: pp.26-32. 18 Jan. 1951. Detailed notes on oviposition and larval and pupal habits of M. neumoegeni, M. evansi, and M. mariae, with remarks on M. polingi, M. stephensi, M. smithi, with foodplants noted for all six. Suggests that M. polingi may be a starved form of neumoegeni. [C.R.]
15. Freeman, H.A., "Distributional Notes on Papilio palamedes Drury and its Subspecies leontia R. & J." Field and Laboratory, vol.19: p.32. 18 Jan. 1951. Records palamedes from Texas and Arkansas, leontia from Texas. [C.R.]
16. Freeman, H.A., "Distributional Notes on the Theclinae of Arkansas." Field and Laboratory, vol.19: pp.36-39. 18 Jan. 1951. Gives records of Atlides halesus, Strymon cecrops, S. m-album, S. melinus, S. ontario, S. titus, S. edwardsii, S. falacer, S. liparops, Mitoura damon, Incisalia irus, I. niphon. [C.R.]
17. Freeman, H.A., "Notes on the Genus Yvretta Hemming with a New Record for the United States." Field and Laboratory, vol.19: pp.45-46. 18 Jan. 1951. Gives key to Y. citrus, Y. rhesus, and Y. carus, with distribution notes on each. Y. citrus is the new U.S.A. record. [C.R.]
18. Freeman, H.A., "New Skipper Records for Mexico." Field and Laboratory, vol.19: pp.46-48. 18 Jan. 1951. Newly recorded are Thorybes bathyllus, Heliopetes sublinea, Atrytone ruricola metacomet, Amblyscirtes celia. [C.R.]

19. Gregor, F. and D. Povolný, "Further important or new discoveries of Lepidoptera from Moravia" [In Czech, English summary]. Acta Soc. Ent. Cechoslovenicae, vol.46: pp.61-62. 1 Feb. 1949. Record Pyralis regalis, Stagmatophora trirvella and Phylobrostis hartmanni, new to Moravia; notes on some other spp. [P.B.]
20. Heath, J., "Further notes on the Lepidoptera from the Falmouth district of South Cornwall." Journ.Soc. Brit. Ent., vol.3: pp.64-65. 5 March 1949.
21. Hohl, F., "A propos de la migration de Pyr. cardui de Juin 1949" [In French]. Bull. Soc. Ent. Mulhouse, 1949: pp.62-63. 1 Sept. 1949.
22. Kaiser, Peter, "Histologische Untersuchungen über die Corpora allata und Prothoraxdrüsen der Lepidopteren in Bezug auf ihre Funktion" [In German]. Arch. Entwicklungsmech., vol.144: pp.99-131, 22 figs. 15 Nov. 1949. Relates changes in size and structure of these glands to molt and metamorphosis. Work done on Pieris and other butterflies. [P.B.]
23. Klots, Alexander B., "Studies of a Connecticut Nexus." The Biological Review (City College of N.Y.), vol.13: pp.14-17, 6 figs. March 1951. Popular account of interrelationships on Alder (Alnus incana) of Wooly Aphid, its predators (larvae of Feniseca tarquinius and a syrphid fly), and its attendant ants. Fine photos including larva, pupae, and adult of Feniseca. [C.R.]
24. de Lucca, C., "Further Notes on Lepidoptera Heterocera from Malta." Ent. Mo. Mag.,vol.85:p.191. July 1949. New records: 8 Noctuidae, 2 Geometridae. [P.B.]
25. McClung, Robert M., Sphinx. The Story of a Caterpillar. 48 pp.; ill. William Morrow and Co., New York. 1949.
26. MacGillavry, D., "Een kleine waarneming bij Vanessa atalanta L." [In Dutch; A stray note on V.a.]. Ent. Berichten, vol.12: p.453. 1 Nov. 1949. Observations on reflection of sunlight by the wing of this species. [A.D.]
27. Martin, Lloyd M., "Spectrum on Wings." Arizona Highways, vol.27, no.4: pp.4-11, 12 col.photos. Apr. 1951. Popular account of Arizona Lepidoptera, illustrated by large photos in color of Arachnis picta hampsoni, Papilio philenor, Agapema galbina, Cisthene schwarziorum, Automeris pamina aurosea, Pholus typhon, Arctonotus terlootii, Miracavera brillians, Nemoria delicataria, Neumoegenia poetica, Papilio daunus, Eupackardia calleta. [C.R.]
28. Muspratt, Vera M., "Pyrameis atalanta L." [In French]. Bull. Soc. Ent. Mulhouse, 1949: pp.61-62. 1 Sept. 1949.
29. Narbel, M., "La maturation chez Solenobia spec. (lichenella L.?) parthénogenètique (Lepid. Psychides). Communication préliminaire" [In French]. Arch. Julius Klaus-Stiftung, vol.23: pp.574-576, 1 pl. 28 Feb. 1949. Maturation divisions in egg described and figured. [P.B.]
30. Obraztsov, N., "Vorläufige kritisch-systematische Notiz über die Gattungen Olethreutes Hb. und Exartema Clem." [In German]. Entom. Zeitschr., vol.59: pp.45-48. 15 June 1949. It is not possible to distinguish correctly these genera only by the dorsal involution of the interior margin of the hind wings. The species involved must be united provisionally in one genus. [G.dL.]
31. Obraztsov, N., "Neue und wenig bekannte Tortriciden-Arten und -Formen" [In German]. Mitt.Münch.Ent. Ges., vol.35/39: pp.198-210, 6 figs. 1 Aug. 1949. Discusses several doubtful species and forms of Tortricidae, especially the genitalia: Archips betulana Hb. has priority over decretana Tr.; A. gilvana Ev. over roseana (and partim of Choristoneura diversana); Aethes chersonana Obr. is a synonym of A. diacrisiana Rbl.; Gypsonoma cnephasiana Obr. is only a subsp. of G. oppressana Tr. Figures genitalia of Polychrosis cognata, Phiaris delitana, Ph. umbrosana, Orthotaenia striana, O. capreolana, O. helvinana, Dichrorampha tashimgana, and D. sheljuzhkoi. Describes as new: Polychrosis cognata (Berdjansk, so.Ukraine), Orthotaenia striana ssp. subcapreolana (Dzharkent, east Semiretshje, Tyshkan); Spilonota ocellana ssp. centralasiae (Dasht, Schugnan, west Pamir), Dichrorampha tshimgana (Tshimgan, west Tian-Shan); D. sheljuzhkoi (Ussuch-tshaj, Achty, Daghestan); Laspeyresia succedana ssp. decolorana (Dzharkent); L. pamira centralasiae (Mt. Bolshoj Tshimgan, west Tian-Shan); also names two aberrations. [G.dL.]
32. Obraztsov, N., "Zur Schwankung der Cornuti-Zahl bei Peronea hastiana (L.) (Lepidoptera, Tortricidae)" [In German]. Mitt. Münch. Ent. Ges., vol.35/39: pp. 211-213, 1 fig. 1 Aug. 1949. Records a striking variability of the number of the cornuti in P.h., which varies from 3 to 6. [G.dL.]
33. Obraztsov, N., "Eine neue Peronea Curt.-Art aus N.-Syrien" [In German]. Mitt. Münch. Ent. Ges., vol.35/39: pp.224-226, 2 figs. 1 Aug. 1949. Describes as new: P. osthelderi (Maras, Taurus, s.e. Turkey) and figures genitalia of the single ♀. [G.dL.]
34. Roepke, W.K.J., "Over de vlinderverzamelingen van het Naturhistoriska Riksmuseet te Stockholm" [In Dutch; On collections of Lepidoptera in the N.R. at Stockholm]. Verslag 8e Herfstvergadering Nederl.Ent. Ver., pp.cviii-cx. 1 Aug. 1949. Impressions of a short visit to the Stockholm Museum during the 8th Intern. Congress of Entomology. Very interesting are the following collections: Dr. R. Malaise's Burma Expedition 1934, so far only partially studied by F. Bryk; a small old collection from the Malay Archipelago, in which Aurivillus' types; a rich African collection studied by Aurivillus, with many types; an interesting local collection with nice series of Parnassius, Colias, Oeneis, Argynnis; a large collection made by Malaise in Korea and studied by Bryk. [A.D.]
35. Seiler, J., "Resultate aus einer Artkreuzung zwischen Solenobia triquetrella F. R. x Solenobia fumosella H. (Lepid. Psychidae) mit Intersexualitat in F_1" [In German]. Arch. Julius Klaus-Stiftung, vol. 24: pp.124-154, 16 figs. 1949. Mechanism of intersex formation said to be the same as for the triploid intersexes of S. triquetrella. [P.B.]
36. Shillito, James F., "Notes on Insects Visiting Diseased Elms." Ent. Mo. Mag., vol.83: pp.290-292. Dec. 1949. Attempts to assign the spp., including 10 Lepidoptera, to their niches in the biocoenosis created by the diseased trees. [P.B.]
37. Tuurala, Osmo, "On the Physiology of the Facetted Eye" [In Swedish, summaries in Finnish and English]. Ann. Ent. Fennici, vol.14, suppl.: pp.219-224, 9 figs. 1949. Summary of structure, with a classification of the superposition eyes of Lepidoptera based on the nature of pigment migration in adaptation to light. [P.B.]
38. Waloff, N., "Observations on larvae of Ephestia elutella Hübner (Lep. Phycitidae) during diapause." Trans. R. Ent. Soc. London, vol.100: pp.147-159, 1 fig. 15 June 1949. Discussion of voltinism and physiology of diapause. Suggests that in this species a prerequisite for release of pupation hormone is loss of about 35% of weight of diapausing larva. [P.B.]
39. Way, M.J., B. Hopkins, P.M. Smith, "Photoperiodism and Diapause in Insects." Nature, vol.164: p. 615. 8 Oct. 1949. Artificially increased day length inhibits normal winter diapause in Diataraxea oleracea (2% diapausing pupae in stocks raised under constant light, as opposed to 100% for 4 or 8 hrs. of daylight out of 24). Some preliminary success also obtained with Pieris brassicae and Mamestra brassicae. [P.B.]

NOTICES BY MEMBERS

All members may use this column to advertise their offerings and needs in Lepidoptera. There is no cost for this service. Unless withdrawn sooner by the member, each notice will appear in three numbers.

MEGATHYMUS YUCCAE ALABAMAE ex-pupae 1951, perfect, spread. Want exotics and Gulf States rarities in exchange.
H.W. Eustis, 2301 Woodbine Rd., Augusta, Georgia.

AMAZON. Collector in northern Brazil accepts orders for prepared Amazonic Lepidoptera and other insects. Walter A. Riffler, Postbox 500, Belém, Estado do Parà, BRASIL.

BUTTERFLIES from Arctic and Far North especially Oeneis, Erebia, Boloria, at reasonable prices. R.J. Fitch, 2235 Pandora St., Vancouver, B.C., CANADA.

Lepidoptera of the arid SOUTHWEST. Will be collecting in southern New Mexico and southwestern Texas during June, July, and August. Careful attention given to lists of desiderata.
L.H. Bridwell, Box 44, Forestburg, Texas.

Wanted to buy: SEITZ' "MACROLEPIDOPTERA of the World" esp. Vols.1, 2, 6, 9, 13, English Translation.
G.F. Schirmer, 2912 N. 45th St., Milwaukee 10, Wis.

Lepidoptera of the Southwest for sale, papered or pinned. Inquiry invited. Lots of 100, either Rhopalocera, Macros, or Micros, priced very low, all with full data. Guaranteed first class material.
F.P. Sala, 1764 Colorado Blvd., Los Angeles 41, Cal.

SPEYERIA DIANA, S. cybele leto and letona, and S. nokomis nitocris, ♂♂ and ♀♀ with full data, offered in exchange for needed species of Erebia and Oeneis, esp. the following numbers from McDunnough 1938 list: 127b-e; 130a-c; 135a; 136a; 138b,c; 140, 143a; 144b-c; 147; 147a; 149b-d; 151; 152. Also need any of forms recently described by dos Passos except taygete fordi and rossii gabrieli. If you have some of these species but are not interested in the Speyeria, send list of desiderata.
Paul R. Ehrlich, 538 Academy St., Maplewood, N.J.

Bio Metal standard redwood insect box, new style, 9 x 13 x 2 1/2 inches. Screw on hinge. Satisfaction guaranteed. $2.25 each, $25.00 per dozen. Also Cornell Drawers and unit pinning trays. Equipment constructed to order in our shop. Bio Metal Associates, Box 346, Beverly Hills, Calif.

For exchange or sale: the very rare Strymon "auretorum" (Bdv.). Also Speyeria. William T. Meyer, 4450 Kingswell Ave., Los Angeles 27, Calif.

Far Eastern Rhopalocera (Japan, Formosa, Korea, etc.) Wish to exchange with all parts of the world. Have interest in Papilionidae (esp. Parnassius, Archon, Hypermnestra, Zerynthia, etc.), Pieridae, Nymphalidae, and Lycaenidae, etc. Inquiry invited. Yoshihiko Hata, #594, Aburanocouji Buccouji, Kyoto, JAPAN.

Speyeria diana ♂ caught this season for sale or exchange for tropical Lepidoptera or Coleoptera. Also have a limited number of Mitoura damon.
Theodore Bock, 70 Ehrman Ave., Cincinnati 20, Ohio.

Wanted: Rhopalocera from Africa, Asia, and Oceania in exchange for Rhopalocera and larger moths from Spanish and European faunas. Very particularly desire all Papilionidae, Delias, Euploea, Cethosia, Charaxes, Kallima, Euphaedra, Euxanthe, and Appias. All correspondence welcomed and answered.
A. Varea de Luque, 13 Ibiza, Madrid, SPAIN.

For sale or exchange: approximately 300 Manitoba moths especially Arctiidae and Noctuidae. All are pinned. What offers? Charles D. Bird, 1930 Rosser Ave., Brandon, Manitoba, CANADA.

Western U.S.A. Lepidoptera offered in exchange for tropical species, esp. from India, and for Speyeria diana and Anaea species.
Mrs. Emily Henriksen, Rt.#1, Sunnyside, Washington.

I am considering a collecting trip to the Hudson Bay region of Canada next summer but it will be necessary to sell part of my catch to defray expenses. Write me if you would be interested in purchasing Lepidoptera, Odonata, or Coleoptera from this area.
C.S. Quelch, Transcona, Manitoba, CANADA.

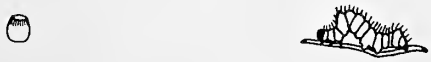
LIVING MATERIAL

Cocoons of Graellsia isabelae ("Spanish luna") and Actias selene (Indian Moon moth) for sale.
O.H. Schroeter, P.O. Box 291, Quaker Hill, Conn.

Join the "Pupa of the Month Club": a pair of living pupae, either Rhop. or Macros each month. Also a list of other available species of the time. Two pair a month for $7.50 per year, postpaid. Four pair a month for $10.00 per year. F.P. Sala, 1764 Colorado Blvd., Los Angeles 41, Calif.

Have Hyalophora cecropia, H. promethea and Antheraea polyphemus cocoons for exchange for living, mounted, or papered Lepidoptera, especially Papilionidae and Sphingidae. Will sell H. cecropia only.
J.W. Morris, 2704 W. Genesee St., Syracuse 9, N.Y.

For sale or exchange: Eupackardia (Callosamia) calleta cocoons.
Robert Ford, 3266 Ardmore Ave., South Gate, Calif.



Professor Wm.T.M. Forbes, of Cornell University, has agreed to present answers to questions submitted by members on any aspect of Lepidoptera study. Questions are to be sent to the editor of the Lep. News.

Q. "Are there any baits that can be used to attract butterflies in the North Temperate Zone?"

A. I have no practical experience with this. The usual mixtures for moths are reported to be useful; also various strong-smelling things unpleasant to us attract some, especially Nymphalidae. For instance, my only Purple Emperor was caught on a fresh donkey-dropping. And perspiration is sometimes attractive, notably to Angle-Wings (Polygonia spp.).

Q. "What is the history of the introduction of Samia walkeri into North America, where did it come from, and to what does the name cynthia apply?"

A. It was introduced into France by persons experimenting on developing a commercial silkworm of the coarser (Tussah etc.) type, and from France into America for the same reason. Cynthia (the Eria Silkworm) breaks into many races, with various foods, chiefly castor bean, Lauraceae and Ailanthus; the chief commercial strain (ricini) feeds on castor oil plant. Ours is advena Packard and probably came from southern China. Cynthia is the correct name for the species as a whole, and is generally applied to the brown race from Java, though Drury states his specimen came from China.

W.T.M.F.

FOOTNOTE ON PAPILIO

In connection with F. Martin Brown's recent analysis of Papilio (Lep. News 4: p.63) the following slight notes may be of interest.

A good character to separate the two main groups of the fluted Papilios is the very long fringe on the inner margin in group B. It is not always equally well developed, and can be easily overlooked, e.g., in homerus itself; but it is very striking in the forms with weak toothing of the costal edge, such as zagreus and euterpinus.

The early stages show that the troilus and glaucus groups are much closer to each other than either is to the thoas and anchisiades groups, which in turn are closely related. In fact the glaucus and troilus groups have the ONLY larvae above the skippers with a fully functional outer row of hooks on the prolegs, adapted only to walking on a silk sheet. Also pilumnus, placed by Rothschild and Jordan in the glaucus group, clearly belongs to the troilus group, and I think the arrangement of the cell of the fore wing will confirm this.

In the protesilaus group, helios from South America is easily recognized by the very large transparent areas; it is also the only member of the group in which the female is taken from time to time, and I think the only one of which the larva is known (on taruma, Vitex montevidensis, on the authority of Prof. Biezanko).

Wm. T.M. Forbes
Ithaca, New York

Bruggemann, P.F., 176 Crerar Ave., Ottawa, Ontario, CANADA.
Diakonoff, A. (Dr.), Rijksmuseum van Natuurlijke Historie, Leiden, NETHERLANDS.
Lennox, D.J., R.F.D. #1, Whitefield, New Hampshire.
Lewis, Elwyn, 427 E. Rankin St., Flint 5, Michigan.
Panske, L.G., 2058 N. Albany Ave., Chicago, Illincis.
Pease, R.W. (Pvt.), U.S. 51011023, Co.#1 BTG, SCRTC, Det. TSU 9600, Camp Gordon, Georgia.
Preston, F.W. 526 Linden Rd., State College, Penna.
Rotger, Bernard (Rev.), Pagosa Springs, Colorado.
Sternitzky, R.F., 300 Farragut St., Vallejo, Calif.
Vernon, J.B., Det.5, 136th CSS, APO 953, c/o P.M., San Francisco, Calif.
Wilson, K.H., 823 East "B" St., Moscow, Idaho.
Wittman, R.N., Box A, Borrego Springs, Calif.

ADDITIONS TO THE MEMBERSHIP LIST

Booth, Oliver E.,907 Clinton Ave.,Des Moines 13,Iowa.
Cottrell, G.W. (Mrs.), 70 Lake View Ave., Cambridge 38, Mass.
Fager, Edward W. (Dr.), Institute of Radiobiology and Biophysics, University of Chicago, Chicago 37, Ill. RHOP: esp. Theclinae. Coll. Ex. Buy.
Fryxell, Thomas, 1331 42nd Ave., Rock Island, Ill.
Hinton, H.E. (Dr.), Dept. of Zoology, University of Bristol, ENGLAND. Phylogeny, Physiology. Coll. (larvae).
Hopf, Alice L. (Mrs.), 136 W. 16th St., New York 11, N.Y. Migration. Coll.
Kilman, Leroy N., 2314 59th St., South, St. Petersburg 7, Florida.
Marks, Louis S., Biological Lab., Fordham University, New York, N.Y. RHOP: esp. Papilio. Coll.
Moulines, A., Grange-Canal, Genève, SWITZERLAND.
Opler, Paul A., 415 Beatrice Road, Concord, Calif.
Phillips, G. Lyle, 2746 Adams St., Salt Lake City, 15, Utah.
Reuss, F.A. Theodore (Dr.), Bärwaldstrasse 4, Pt.V, 1, Berlin S.W. 61, GERMANY.
Riffler, Walter A., Caixa Postal 500, Belem, Parà, BRASIL. Coll. Sell.
Rogerson, John L., 30 First Ave., Coniston, Ontario, CANADA.
Rubbert, Allen, 1915 Terrace Way, Bakersfield, Calif.
Sams, Robert, Jr., 172 Huntington Rd., N.W., Atlanta, Georgia.
Shaw, J.P., Box 1056, Weyburn, Sask., CANADA.
Sheldrick, Peter, Mt. Kemble Ave., Morristown, N.J.
Treat, Asher E., 51 Colonial Parkway, Dumont, N.J. MACRO: esp. Nemoria, Dichorda. MICRO: esp. Eucleidae. Life History.
Welling, Edward C., 700 East 240th St., Euclid 23, Ohio. LEPID: esp. Speyeria, Melitaea, Papilionidae, etc. Sugar-baiting. Coll. Ex.
Zappalorti, Michael, 123 Androrette St., Charleston 9, Staten Island, N.Y. RHOP. and MACRO: local and exotic. Coll. Ex. Buy. Sell.

DECEASED

Johnston, Edward C. (Washington).
Toxopeus, L.J. (Prof.Dr.) (Indonesia).

PLEASE SEND PROMPT
NOTIFICATION OF ADDRESS CHANGES
TO THE EDITORIAL OFFICE

THE LEPIDOPTERISTS' SOCIETY

The object of the Lepidopterists' Society, which was formed in May, 1947, and formally constituted in December, 1950, is "to promote the science of lepidopterology in all its branches, ... to issue a periodical and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to secure cooperation in all measures" directed toward these aims (Constitution, Art.II). A special goal is to secure free interchange among the lepidopterists of all countries.

Membership in the Society is open to all persons interested in any aspect of lepidopterology. Prospective members must be nominated by two members in good standing and then become members by paying the current annual dues. Memberships are for full calendar years only. All members in good standing receive The Lepidopterists' News. Institutions may subscribe to the publications but may not become members. Applications for membership should be sent to the Secretary, and all correspondence concerning membership and general Society business should be directed to him. Completed membership forms and remittances should be sent directly to the Treasurer. All remittances should be made payable to: The Lepidopterists' Society. There are three paying classes of membership:

Active Members - annual dues $2.00 (U.S.A.)
Sustaining Members - annual dues $5.00 (U.S.A.)
Life Members - single sum $50.00 (U.S.A.)

The minimum fee for Active Members is not sufficient to finance the News and other Society activities. Nevertheless, this fee is kept low so that cost of membership will not be burdensome to any member, regardless of monetary difficulties in his country or private economic reasons. Obviously, the Sustaining Members make up the difference. A large proportion of the Society members have always maintained themselves generously in the Sustaining category. Members not yet Sustaining are earnestly urged to consider elevating their class of membership.

Each year a list of all members of the Society is published, with addresses and special interests.

An Annual Meeting is held each year at which election of officers and presentation of papers and exhibits take place. All members of the Society are expected to vote for officers when mail ballots are distributed by the Secretary. Special Meetings may be called by the Secretary on receipt of a written request from the President or signed by ten members.

NOTICE TO CONTRIBUTORS TO THE NEWS

Contributions to The Lepidopterists' News may be on any aspect of the study and collection of Lepidoptera in any part of the world, except that papers describing new species, genera, etc., or proposing nomenclatural changes, should be published in more formal journals and will not be accepted for the News. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (e.g., mimicry, wing venation); 2) field notes of more than a very local nature; 3) notes on well-tested techniques; and 4) news of lepidopterology (e.g., personalia, societies, new periodicals). Line drawings are easily handled in the News; authors should write the Editor for details concerning the correct size for original drawings. Photographs should be very sharp and have good contrast.

Manuscripts should be typed if possible, but clear hand-written manuscripts are acceptable. ALL MANUSCRIPTS SHOULD BE DOUBLE-SPACED (blank lines alternating with written lines), and wide right and left margins are needed.

Ordinarily, manuscripts should be in English. However, the editors will translate short notes which are received in French, German, Spanish, Portuguese, or Russian. Authors of longer manuscripts who do not find English easy should prepare an English manuscript and permit the editors to correct the writing. Brief summaries in non-English languages are always welcomed at the end of any paper.

Authors may request in advance about 75 gratis separates of any paper over one column in length. Additional separates are available IF ORDERED IN ADVANCE, at the rate of $3.00 per hundred for papers of any number of pages within a single issue. Ordinarily, the cost of photographs will be charged to authors, but the rate is low. There is no extra cost for line drawings.

The editors reserve the right to adjust style (citation of references, italicizing names, etc.) to fit News standards of uniformity.

TABLE OF CONTENTS — SOMMAIRE — INHALT

VOLUME 5 1951 NUMBERS 3-5

The LEPIDOPTERISTS' NEWS

Published by THE LEPIDOPTERISTS' SOCIETY
Publié par LA SOCIÉTÉ DES LÉPIDOPTÉRISTES
Herausgegeben von der GESELLSCHAFT DER LEPIDOPTEROLOGEN

IN THIS ISSUE

SECOND ANNUAL MEETING OF THE SOCIETY

December 28-29, 1951

CHICAGO NATURAL HISTORY MUSEUM

(see page 42)

The Lepidopterists' News

Volume V 1951 Numbers 3-5

GEOGRAPHIC SUBSPECIATION IN THE LEPIDOPTERA

A Symposium
Presented at the First Annual Meeting of The Lepidopterists' Society
New York, U.S.A., 29 December 1950

I. Introduction: A GENERAL OUTLINE OF SUBSPECIATION

by Charles L. Remington
Yale University
New Haven, Connecticut

Our meeting this afternoon is for the purpose of examining the geographical subspecies concept as applied to the Lepidoptera. I shall try to set forth some of the general theoretical aspects of subspeciation now widely accepted among modern systematists and evolutionists. The major portion of the symposium will be devoted to the presentation of the subspeciation phenomena found in each of the several faunal regions or taxonomic groups, by five Society members who are authorities on subjects on which they will speak.

Most of us here today are best acquainted with North American butterflies and moths, and most of us are familiar with the existence of geographic subspecies. Some of these subspecies are strikingly unlike, such as the Floridian and the northeastern races of Limenitis archippus (Cramer), the Viceroy, or the eastern and western races of Pachysphinx modesta (Harris), the big Poplar Sphinx Moth. Some are conspicuously unlike in one sex, for example, the northern and the southeastern races of Papilio glaucus (Linné), the familiar Tiger Swallowtail [see fig.1]. But the differences are usually more subtle.

First, it is necessary to state clearly that A SUBSPECIES IS A POPULATION, NOT AN INDIVIDUAL. Since a matter of considerable practical importance to us is the process of applying a name to any specimen we may have, the population concept finds us in an occasional awkward spot. Returning to the Tiger Swallowtail, we find that in the Arkansas population the female is characteristically blackish and that in the Massachusetts population the female is characteristically like the male (yellow with black lines). I believe that this dark female form will be found to be controlled by a single gene (pair of alleles). In Arkansas, if we rear adults from many female larvae, perhaps a few of them will emerge as yellow-and-black adults. A question is, can we call those few: "subspecies turnus", like the Massachusetts females which they closely resemble? And the answer must be, NO. For a clear designation we could refer to the two female forms in Arkansas as "Papilio glaucus glaucus yellow female" and "Papilio glaucus glaucus dark (or normal) female". Then a dark female in Massachusetts which was known to be native (and not an immigrant from the South or an offspring of such an immigrant) would be designated "Papilio glaucus turnus dark female". A clarifying point in this case is that a block of ten males from Arkansas and a block of ten from Massachusetts, collected at random, can be distinguished rather readily when studied as series. If we rear male offspring of our Arkansas yellow female, they will be clearly of the Arkansas type, and if we rear males from the Massachusetts dark female, they will be clearly of the Massachusetts type. SUBSPECIES DIFFERENCES, LIKE SPECIES DIFFERENCES, ARE A COMBINATION OF SEVERAL CHARACTERS, not just one, although one character will often suffice for rapid identification.

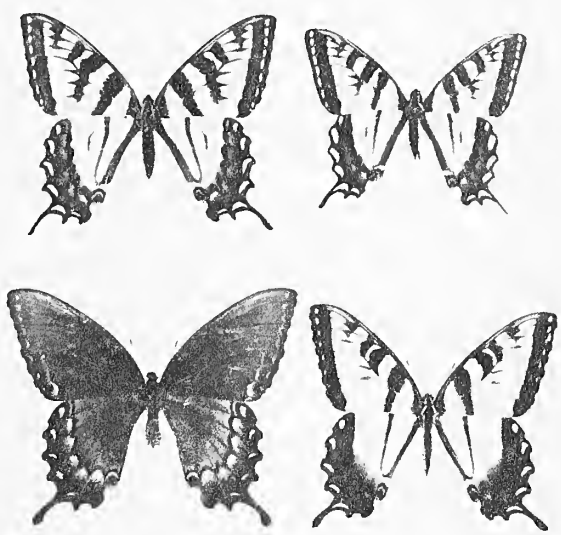


Fig.1. Papilio glaucus L., subsp. turnus above, subsp. glaucus below (♀♀ on left, ♂♂ on right).

It should be added that in Missouri, Maryland, and other middle states, the two female forms are present in nearly equal numbers. Furthermore, the males fall between the northern turnus and the southern glaucus. There is a rather even gradient both in the percentage of the female forms and in the less conspicuous differences seen in the males. The point at which we draw the line between glaucus and turnus is purely arbitrary and thus a controversial matter. However, a very convenient method has been proposed by Huxley to deal with the even trend from one subspecies to another. He calls the steady trend a CLINE and the intermediate POPULATIONS not readily referable to one of the two subspecies names are designated with a "Cl.", followed by the names of both subspecies, hyphenated. Using this system, we would refer to the populations from the District of Columbia or central Illinois as: "Papilio glaucus Cl. glaucus-turnus".[1]

A second generalization, which proceeds logically from the preceding definition of a SUBSPECIES AS A POPULATION, is that MOST, IF NOT ALL, SUBSPECIES ARE IN FACT GEOGRAPHICAL; that is, no two subspecies are permanent residents in the same locality. For Lepidoptera, foodplant subspecies have been claimed to exist, by various authors. In most, if not all, cases of reported ("sympatric") so-called "foodplant subspecies", they are probably two distinct species and hybridize little if at all. Examples are Franclemont's Symmerista leucitys on Maple vs. S. albifrons (J.E. Smith) on Oak, and Rawson and Ziegler's Mitoura hesseli on White Cedar vs. M. gryneus (Hübner) on Red Cedar. We can say that NO TWO SUBSPECIES PERMANENTLY OCCUPY THE SAME LOCALITY, for a fundamental reason, namely that a characteristic of subspecies is that they can and will intermate and produce fertile offspring if given the opportunity, whereas species rarely intermate at all and when they do, fully fertile offspring cannot result. From this it follows that if two subspecies did coexist they would intermate so freely that differences would disappear and soon only one subspecies would occupy the region.

It must be noted, however, that two or more different subspecies may be found in one locality on rare occasions, but only one is the permanent and abundant resident of the locality; all others are immigrants whose characteristics are not successful in the locality invaded and therefore disappear quickly.

The third major principle I want to consider may be shown by describing ONE POSSIBLE MANNER OF ORIGIN OF SUBSPECIES AND SUBSPECIFIC DIFFERENCES. Although the general PROCESS on continental land masses is probably similar to this, the EVENTS may differ greatly.

Let us try to imagine the likely situation for one species when the last great Pleistocene glaciation had reached its southernmost limit. The plants very near the ice were lichens, a few sedges, grasses, dwarf willows, and other plants we now find only in the Arctic or on mountain tops. Then came a broad band of spruce, lodgepole pine, aspen, and other plants now found in much of Canada and below timberline on mountains. Third came a broader band of hard maple, hemlock, birch, ash, yellow pine, and other plants now found in the northern States and at medium levels on mountains. Each of these bands was limited primarily by the temperature range and level (suppose that the temperatures in the lichen band ranged usually from -60° F. to +50° F.; in the spruce band from -20° F. to +70° F.; and in the maple band from -10° F. to +90° F.). Now suppose that the single species of Lepidoptera whose subspeciation we are following was restricted to the spruce-aspen band by temperature-tolerance limits, but that it further required a certain wild cherry for foodplant and could survive only where the humidity never dropped below 50% for more than a few days. At the time of greatest extent of the ice all these requirements were met throughout the whole temperature band, from the Atlantic coast to the Black Hills, and over most of the region to the west in which there were only separated mountain glaciers but where conditions were profoundly controlled by the presence of the great ice mass [fig.2].

As the world climate became warmer and the ice was steadily melted on its southern edge, the temperature bands were of course shifted steadily northward. In this process our Lepidopteron on the southern edge was being exterminated, but it was able to occupy new territory on its northern edge. Gradually, irregularities in the terrain were revealed as the ice sheet dwindled, with newly re-exposed mountains, valleys, and basins creating air-currents which changed markedly the rain and snow-fall in their vicinity. Broad arid zones appeared which were uninhabitable for our species and left its populations extending southward in tongues and bulges. In the mountains the species moved steadily up the slopes as the climate became warmer and warmer. In flatter terrain the species merely moved northward, leaving no southern remnant. Also, in mountains too low or too southern the necessary temperature band moved right up above the mountain tops, and the populations of our species disappeared there. Some of the sufficiently high mountains would of course be rather isolated loops without continuity to the next loop. Thus, isolated but thriving populations of our Lepidopteron would be left behind. [See fig.3.] I will not continue this step-by-step treatment here, but you can easily see the course leading to the situation we would find today, which I can roughly outline as follows:

The temperature band now exists at sea level across central latitudes of eastern and western Canada and is found on a few mountain areas of the Appalachian chain, down the center as far as northern Michigan and Minnesota, and right down the Rocky Mts. into New Mexico and down the western cordillera to central California, and with very isolated populations in high ranges like the Wind River Range, the Rabbit Ears Range, the Grand Mesa, the Wasatch Mts., and so on (fig.4).

We can thus see how our species may have attained its present interesting distribution. There are very many species with such ranges, examples being Pieris

---

1. See also the articles by Kiriakoff and Remington in the Lep. News, vol.2: pp.3-4, 15, 16; 1948.

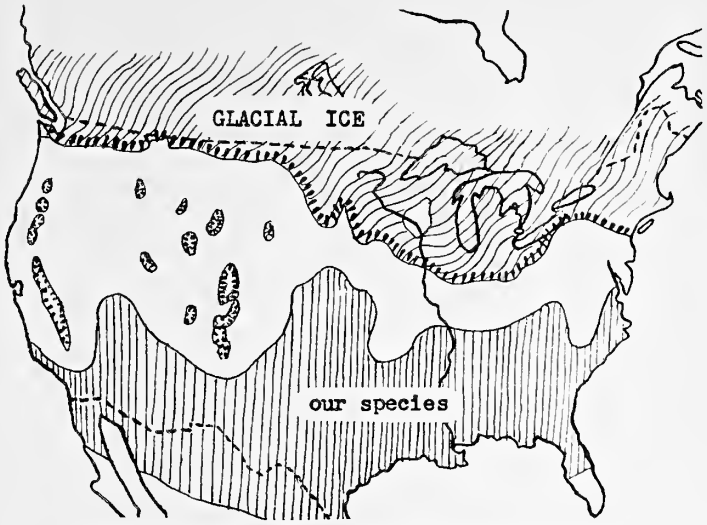


Fig.2. Last Glaciation at Maximum Limit.

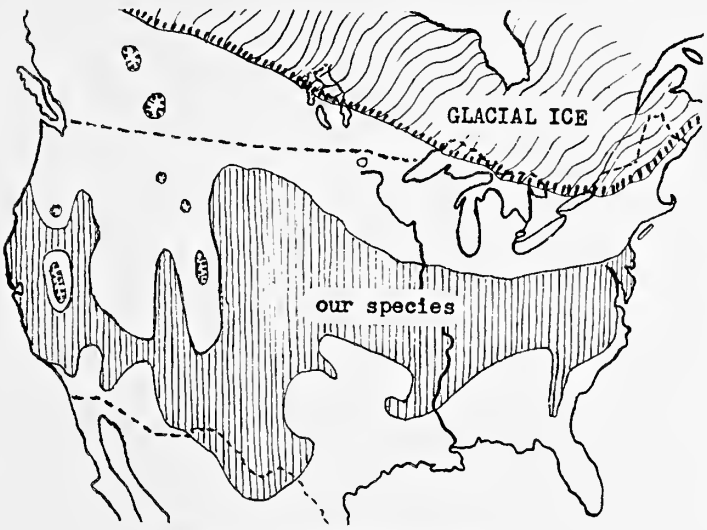


Fig.3. Glaciation Receding.

Fig.4. Present Conditions.

napi (L.), Pyrgus centaureae (Rambur), the Colias interior Scudder group, Glaucopsyche lygdamus (Dbldy.), Celerio galii (Rott.), Arctia caja (Linné) and so on.

Now the question arises as to how the subspecific differences appear in these populations, differences which allow us to recognize the populations by wing markings and other less obvious characters.

Each of the populations of a species is in somewhat different environmental conditions, and the more carefully we study them IN THE FIELD, the more obvious these differences become. The Wasatch Mts. may have generally pale rocks and soil while the nearby Rabbit Ears Range may have very dark rocks and soil. How does the Rabbit Ears population of our imaginary species become dark like the substratum, and how does the Wasatch population become pale like its substratum?

Suppose that our species arrived in these two ranges with a generally gray color and its main enemies were birds or mammals which depended on sight to catch the Lepidopteron. Mutations of its genes (the hereditary controllers which I have no time to explain here but which are clearly treated in E.B. Ford's Butterflies*) are random and therefore presumably produce, in both the Wasatch and Rabbit Ears populations, individuals which are black and individuals which are white. The original grays are more easily seen than the blacks on the dark rocks of the Rabbit Ears Range. Therefore, each of these new blacks has a better chance of escaping and producing offspring than does any of the grays, and the percentage of blacks will rise steadily in each succeeding generation until the original gray type has virtually disappeared. In contrast, all the new whites will be even worse adapted than their gray and black brethren and will be eliminated by natural selection whenever they appear.

The reverse will of course be true in the Wasatch Mts., where the new whites will eventually eliminate the original group and the new blacks will always be quickly lost.

By this process, which I have of course vastly over-simplified, we now have a generally gray species found over a wide range, but with a black subspecies in the Rabbit Ears Range and a white subspecies in the Wasatch Mts., all three types now equipped with concealing coloration in their respective regions (Fig.5).

(continued on next page)

---

* 368 pp., 58 pls. (34 col.), published by Collins, St. James Place, London, England, and obtainable from them, or through most bookstores. [See review in Lep. News, vol.1: p.3; 1947.]

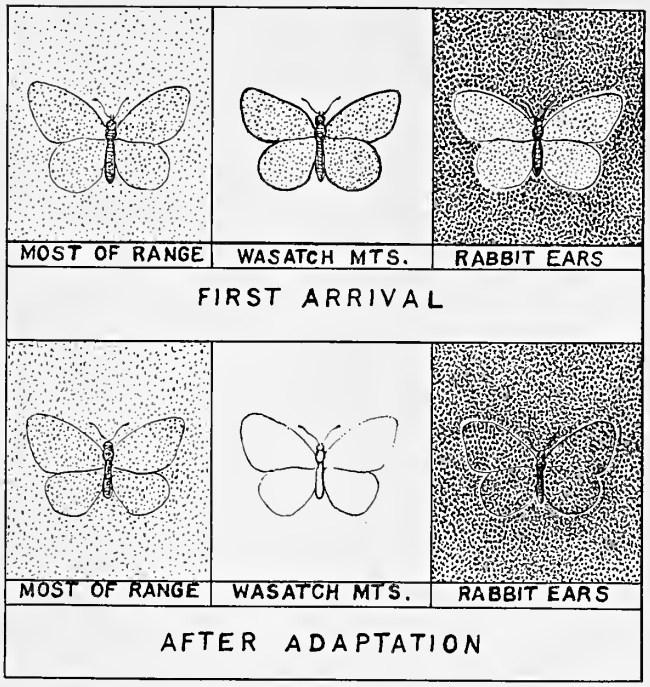


Fig. 5.

One last theoretical point I want to make concerns THE FATE OF THESE GEOGRAPHIC SUBSPECIES. A widely accepted view today is that species always arise from subspecies. This means that subspecies are potential species. The sterility barrier which we expect between species, with the correlative lack of successful hybridizing, is the result of an accumulation of a large number of genetic differences, not only of color as in the Wasatch and Rabbit Ears subspecies, but also of structure, flight habits, courtship patterns, tolerances of temperature, light, wind, and humidity, and in many cases foodplant differences. These differences must accumulate during a long period of isolation. Otherwise, too frequent interbreeding with other populations will continually dilute out the differences. Thus, a subspecies may become completely isolated for a long time from all other populations of the parent species and eventually become a distinct species, or the isolation may not be complete enough or for a long enough time and the subspecies will remain rather similar to other subspecies or may even lose its identity entirely.

Please let me emphasize that my main examples have been hypothetical and were concocted to help me explain theoretical points. No real examples from the Lepidoptera have been followed far enough to prove these points, although other organisms have been so studied.

II. SUBSPECIATION AMONG SPHINGID MOTHS OF THE WEST INDIES

by Margaret M. Cary
Mt. Airy, Philadelphia, Pennsylvania

Map of the West Indies

I must speak of this as an introduction to the study of subspeciation among Sphingidae of the Antilles because very little has been done along this line in any of the West Indies. Many collectors have worked there, and it is one of the very oldest collecting localities. These collectors and taxonomists have noted the many subspecies found in these subtropical islands but little work has been done with environmental differences, with rearing of subspecies, with foodplant specialization, or with the causes of geographic subspeciation in the Islands, ideally situated though they are for such a study. Here we find small isolated populations and a most interesting geologic history. The island called Hispaniola, which is divided politically into Haiti and Santo Domingo, has been much neglected even by collectors, and the island of Puerto Rico has been so denuded of original vegetation, including its former magnificent forest cover, by an ever-increasing population of impoverished inhabitants, that any comparison of present subspecies with past populations is regrettably uncertain.

In speaking of Antillean subspecies of Sphingidae I am speaking only of those endemic to the islands. To illustrate this: - Erinnyis lassauxi omphaleae (Bdv.) and Erinnyis lassauxi merianae (Grote) are found on the islands, but both occur on adjacent continental areas. As far as is now known we have 32 subspecies of Sphingidae on the Greater and Lesser Antilles and let me state here very clearly that the island of TRINIDAD IS NOT ONE OF THE ANTILLES but a part of the continental shelf of South America.

In this paper I am following Ernst Mayr's defin-

SUBSPECIATION SYMPOSIUM. Cary: West Indian Sphingidae - cont.

ition of a subspecies, found on page 106 of his book, Systematics and the Origin of Species: "The subspecies or geographic race is a geographically localized subdivision of the species which differs genetically and taxonomically from other subdivisions of the species." In dealing with subspeciation we find two processes involved, the development of diversities, and the establishment of discontinuities. The Antilles are admirably suited to a study of subspeciation of Sphingidae through geographic isolation, because here we are dealing: with small populations isolated from parental groups and developing as races which because of localized foodplants tend to become sedentary and restricted; with repeated invasions in some cases; and with certain moths more given than others to variation, exhibiting diversity in pattern, color, size, etc., probably attributable to processes of natural selection.

I have chosen for special discussion eight Antillean subspecies of Sphingidae, because several of these eight have the nominotypical race endemic to the Antilles, because some of these eight have a marked tendency to variation, because some of them seem to illustrate the theory of successive immigrations to the islands, and because some of them lend themselves to interesting comparisons with similar species not only on adjacent continental areas but with those on our only Western Hemisphere group of islands comparable to the Antilles, the Galapagos Islands. Phlegethontius sextus, the common Tobacco Moth of North America and Mexico, is represented on the Greater Antilles (Cuba, Jamaica, Puerto Rico, and Hispaniola) by race jamaicensis, differing mainly in its greater average size, in its brownish tinge, in its clouded white bands of the lower wing and in slight differences in the genitalia. On the Lesser Antilles, especially on the islands of Dominica and St. Lucia is found the much smaller, more monotonously colored race, lucia, with bands on the hind wings pure black and white. On Trinidad, which is part of the Parian Shelf of Venezuela, we have the South American subspecies paphus (Cram.). I feel that geographic isolation is the cause of subspeciation here. Various members of the Nightshade family (Solanaceae), on which the larvae of sextus feed, are distributed through North America, Mexico, Central and South America, and the Antilles. There seems no evidence here of adaptive evolution since foodplants, predators, and parasites, and general habitat conditions are similar in all of the Caribbean islands. P. sextus reached the islands long ago geologically, probably after the Miocene submergence of all but the highlands of the Greater Antilles, and has evolved separately because of isolation. However, Phlegethontius rusticus is, I think, illustrative of different invasions, some of which are probably continuing today. The parent form of rusticus occurs in North and South America, Mexico, Trinidad, Jamaica, Puerto Rico, and Haiti, as well as in Cuba along with P. rusticus cubanus, a smaller brown form with the brown discal area of forewing spread to the outer margin of forewing. P. rusticus occurs in Haiti along with a large and striking narrower-winged subspecies, very black and handsome, called dominicanus. The subspecies of the Lesser Antilles called harterti is like the nominotypical rusticus except that the dark costal marginal triangle is very light. P. rusticus postscriptus (Clark) is found on the Galapagos Islands and it may well be that Phlegethontius nigritus (R.&J.), found there also, traces its long descent from rusticus, though here we find a slight change in the wing-shape. In P. brontes we have a very variable moth whose nominotypical race is in Jamaica and exceedingly common. Its foodplant is the yellow-flowered Tecoma stans, quite abundant on the Greater and Lesser Antilles. The Cuban subspecies, cubensis, is smaller and less strikingly marked, and has probably been blown to Florida in hurricanes, since we have caught it there over petunias at dusk at Everglades. It is certainly scarce in Florida and I think also in Cuba. It probably feeds on another member of the Bignoniaceae in Florida, as Tecoma stans is not in Florida. In Haiti P. brontes haitiensis is very common and is the black and white form of this insect. Puerto Rico has the more creamy brown subspecies smythi, a large, handsome insect but apparently scarce.

We now come to Isognathus rimosa, one of the species which gives rise to at least eight genitalically distinct subspecies in the Antilles and adjacent continental areas, as well as probably two very constant forms in Cuba which may well be overlapping ends of circles. Isognathus r. rimosa occurs apparently only on Cuba, where we also have two most interesting forms, sometimes listed as subspecies. I. rimosa congratulans Grote&Rob. and I. rimosa woodi Ramsden. Dr. Karl Jordan, of Tring, believes these to be forms of rimosa rather than subspecies and since two subspecies of the same species do not coexist as separate entities in the same locality, rather tending to intergrade, we shall call them forms. But much more study must be done here in Cuba as to the definite geographical locations of these two forms, their foodplants, etc. In appearance congratulans has the same tan color as subspecies rimosa but lacks the characteristic trapezoidal black marking on forewing. I. r. woodi is remarkably different looking, a clouded black and white insect, rather ghostlike in appearance and very striking, really resembling its parent form only in its striped body. In Jamaica we find the large and handsome subspecies jamaicensis, of which there are only the following specimens recorded in collections: - one at the Carnegie Museum, Pittsburgh (Collection Holland, Oberthür, Clark); one at the Institute of Jamaica in Kingston; and one in the private collection of Bernard Heineman. In Hispaniola we have I. rimosa molitor which appears to be quite abundant there and is a handsome whitish insect. In Puerto Rico there is subspecies wolcotti, differing from other subspecies of rimosa on the Islands by having a much narrower black band on the hind wing, the ground color here being brownish as in I. r. rimosa and I. r. jamaicensis instead of white as in I. r. molitor and the continental I. r. papayae. It seems a connecting link among the subspecies of this variable insect. Subspecies papayae is also in Trinidad, and inclitus in Mexico, while other subspecies of rimosa are in Brazil and other parts of South America.

Pachylia syces syces is found in Mexico and Central and South America, though in my long collecting experience nowhere as common as P. ficus. In Jamaica

SUBSPECIES OF SPHINGIDAE ENDEMIC IN THE ANTILLES					MEXICO AND CENTRAL AMERICA
JAMAICA	CUBA	HISPANIOLA	PUERTO RICO	LESSER ANTILLES	
COCYTIUS vitrinus musgravi Clark	v. vitrinus R.&J.				PHLEGETHONTIUS occultus pacificus Mooser hannibal mayeri Mooser lucetius nubilus R.&J. lefeburei bossardi Gehlen floristan cabnal Schaus floristan ishkal Schaus crocala tepici Clark
PHLEGETHONTIUS sextus jamaicensis Btlr.	sextus jamaicensis Btlr.	sextus jamaicensis Btlr.	sextus jamaicensis Btlr.	sextus lucia Gehlen	
r. rusticus Fab. (not endemic)	rusticus cubanus Wood	rusticus dominicanus Gehlen [r. rusticus Fab. also is here]	r. rusticus Fab. (not endemic)	rusticus harterti Rothsch.	
b. brontes Dru.	brontes cubensis Grt.	brontes haitiensis Clark	brontes smythi Clark	brontes in some form probably on L. Antilles since foodplant (Tecoma) there afflictus bahamensis (one specimen only)	NANNOPARCE poeyi haterius Druce SPHINX libocedrus achotla Mooser separatus melaena R.&J. chersis mexicanus R.&J.
AMPLYPTERUS gannascus jamaicensis R.&J.	gannascus cubanus R.&J.				AMPLYPTERUS donysa dariensis R.&J.
ISOGNATHUS rimosa jamaicensis R.&J.	r. rimosa Grt. (and congratulans and woodi? see text)	rimosa molitor R.&J.	rimosa wolcotti Clark		SMERINTHUS cerisyi saliceti Bdv.
ERYNNIS obscura jamaicensis Clark domingonis pallescens Clark				obscura stheno Hbn.	CALASYMBOLUS myops macrops Gehlen ISOGNATHUS rimosa inclitus Edw.
PACHYLIA syces insularis R.&J.	syces cubensis Closs			PERIGONIA *lusca major Clark *lusca bahamensis Clark	ERINNYIS obscura soccorrensis Clark HEMEROPLANES pan denticulata Schs.
SESIA tantalus sumelus Jordan	titan cubensis Clark				MADORYX bubastus butleri Kirby
PHOLUS s. satellitia Dru.	satellitia posticatus Grt.			satellitia posticatus Grt.	SESIA tantalus clavipes R.&J.
vitis hesperidum Kby.	v. vitis (as on continent)	v. vitis Linné	v. vitis Linné	vitis fuscatus R.&J.	AMPELOECA myron mexicana Gehlen
XYLOPHANES c. chiron Dru.	chiron cubanus R.&J.	**chiron nechus Cram.	**chiron nechus Cram.	chiron lucianus R.&J.	ARCTONOTUS terlooi mooseri Clark
					XYLOPHANES amadis cyrene Druce thyelia salvini Druce

* These are not 2 subspecies from the same locality but are from different islands.

**Both Draudt and Forbes have this subspecies occurring in Puerto Rico and Hispaniola; I would expect that X. chiron might occur, but not the continental nechus. I have seen no specimen from these two islands myself.

SUBSPECIATION SYMPOSIUM. Cary: West Indian Sphingidae- concl.

it has become subspecies insularis, with the median light spots on the costal and lower margin of the forewing merging to make a solid light median band on this wing. P. insularis is said to occur on Hispaniola but I have seen no specimens from there. P. syces cubensis is very much smaller, monotonously dull brown with only the light apices and costal spots distinct. I have syces from Santa Catarina, Brazil, in which the light spots are close together, almost joining as in insularis, and there is a specimen reported from Mexico where this is also true.

In Pholus satellitia we again have the nominotypical subspecies in the West Indies (Jamaica). This is another species so variable that were it not for its constantly double cell-spots, we would hardly recognize some of the forms as belonging to this species. We think at once of the common P. satellitia pandorus (Hbn.) of the eastern seaboard of the U.S.A. and of the very common P. satellitia lichaon (Cram.) of South America and Trinidad. Cuba has the beautiful subspecies posticatus, found also on the Bahamas. A color form of posticatus occurring in Cuba is called cinnamomea, often recorded as a subspecies of satellitia. The well known and beautiful Pholus vitis vitis of Florida, Mexico, South America, and Trinidad is found on most of the Greater Antilles (Cuba, Hispaniola, Puerto Rico) but on Jamaica is found the much darker and handsomer race hesperidum, whose underside is red and whose forewing has two instead of three horizontal curving white lines. P. vitus fuscatus is found on the Lesser Antilles, in general a less clearly marked and more suffused subspecies. In Xylophanes chiron we have another nominotypical subspecies in Jamaica, with X. c. cubanus in Cuba, and X. c. luciana on the Lesser Antilles. The very common Xylophanes chiron nechus is the continental form found in Florida, Mexico, Venezuela, etc. In one night at light in Venezuela we took 110 specimens of nechus!

For easier comparison I have added a table to show the endemic subspecies of Sphingidae on the Antilles, a much greater number than in Florida or a comparable area of continental South America, especially nearby Venezuela. Florida has three endemic subspecies (Dolba hylaeus floridensis Clark, Ampeloeca myron chotus Hbn., Amphion nessus floridensis Clark); Venezuela has two (Isognathus rimosa papayae Bdv. and Xylophanes germen yurakano Lichy). Trinidad also has papayae and the endemic race, trinitas Closs, of Xylophanes neoptolemus. Mexico, however, because of its differences in environments, its deserts, high tablelands, and towering snowpeaks, its jungles and other natural barriers, has twenty-three endemic subspecies of Sphingidae. I have listed them all on the table; but one, Nannoparce poeyi haterius, is of special interest from the point of view of geologic history. N. p. poeyi, the niminotypical race, is found in Jamaica, Cuba, and Hispaniola, and for this species we find a subspecies in Yucatan. There are geologists who believe there was a former land connection between Yucatan and the western end of Cuba. This is also suggested by Xylophanes porcus, recorded in the West Indies only from Cuba and widely represented in Mexico, Venezuela, etc., by X. porcus continentalis R.&J. Unfortunately the rocks have so far revealed no sphingid fossils so we must guess at the geological history of our Antillean Sphingidae. Hurricanes and some form of water transportation probably account for the wafting of these moths to the Islands, perhaps in the Miocene after the re-emergence, and there are probably continuing invasions of some of the stronger flying Sphinx-moths either by direct flight over water or carried via ships.

There seems to me to be little in favor of the idea that the differences between the island subspecies of Sphingidae on the Antilles are of adaptive significance in evolution. All of the Antilles are much alike in their climate, foodplants, etc., yet the populations of Sphingidae on the different islands, relatively only a few miles apart, have developed into differentiated subspecies. We have no wide deserts or high mountains to act as barriers.

There is considerable evidence suggesting different invasions of Sphingidae on the West Indies. In the case of Erinnyis obscura jamaicensis there is evidence of an ancient invasion and geographic isolation causing this species to evolve into a subspecies. Erinnyis o. obscura is also caught in Jamaica, and this points to a second, much later invasion, where the two forms met but remained segregated because of developed gene discontinuities. Another sphingid moth showing evidence of different invasions is Phlegethontius rusticus, already referred to. It looks as though P. rusticus cubanus and P. r. dominicanus had become distinct before the secondary invasion of P. r. rusticus to these islands.

Whether the West Indies are in fact purely oceanic islands or are fragments of a continent, the Sphingidae have developed as though they were oceanic islands. Mayr writes, page 173: "Oceanic islands are defined as all those islands that have received their fauna from other islands or from neighboring continents by transoceanic colonization, and not over land bridges." Sphinx moths evolved late among Lepidoptera. Their distribution on the Antilles is, I believe, largely transoceanic. Still, there were certain connections geologically among the islands of the Greater Antilles that are of special interest in viewing subspeciation of Sphingidae. At one time Jamaica was undoubtedly connected with Hispaniola. At another time Hispaniola was connected with Cuba. The distribution of Sphigidae on Hispaniola, so far as our insufficient data go, indicates a clear relationship to both Cuba and Jamaica. The distinctness of island populations of Sphingidae in the Antilles seems to depend on the size of the island, the length of geologic time in its effective isolation, and the amount of chance dispersal over water and through the air. These factors coupled with the small size and isolation of populations, with certain species which because of localized foodplants tend to become sedentary and restricted in range, with some cases of repeated invasions, and with certain moths more given than others to variation, seem adequate causes to produce the 32 existing subspecies of Sphingidae in the West Indies.

III. HOLARCTIC BUTTERFLY SPECIATION AND SUBSPECIATION, ESPECIALLY IN NORTH AMERICA

by Alexander B. Klots
City College of New York and American Museum of Natural History, New York

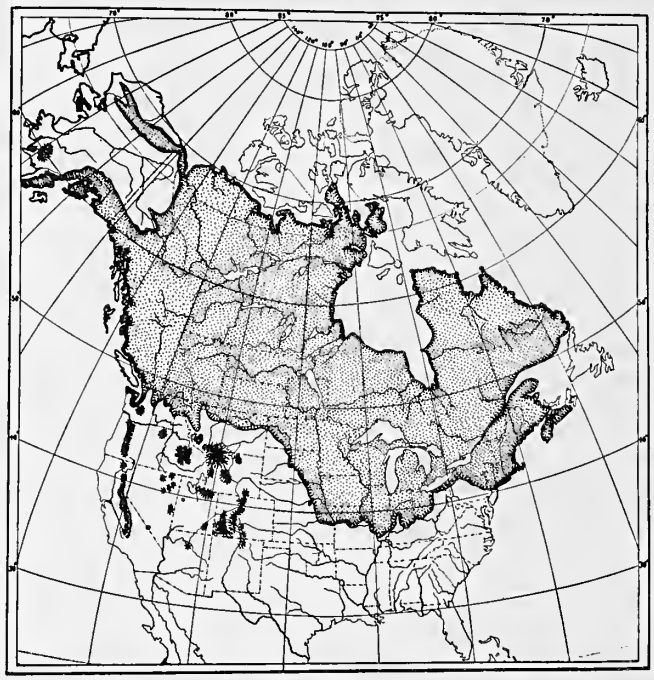
The term "Holarctic" is used to refer to the biota of the boreal regions of both the Old and New Worlds; "Palaearctic" applies to the subdivision in the Old World, and "Nearctic" to that of the New World. Be it noted that in this article these terms are used with specific reference to ORIGINS, and not necessarily to distributions. Many organisms now occurring widely in the boreal regions had their origins elsewhere. In any attempt to study their history we must consider such forms with the biota as a part of which they evolved, and not with one into which they may have subsequently migrated.

Thus, a great many of the North American butterflies are Neotropical in origin. Some familiar examples are: SATYRIDAE - Euptychia; all HELICONIIDAE; NYMPHALIDAE - Euptoieta, Anartia, Eunica, Anaea; most or all RIODINIDAE; LYCAENIDAE - Eumaeus, Atlides, many species of Strymon, Leptotes, Hemiargus, etc.; PAPILIONIDAE - P. philenor L., polydamus L., marcellus Cram., etc.; PIERIDAE- Anteos, Phoebis, Kricogonia, Eurema, Appias, and Ascia; HESPERIIDAE - Phocides, Polygonus, Epargyreus, Heliopetes, Atrytone, Atrytonopsis, Lerodea, Calpodes, Panoquina, etc. We must exclude all such from a study of the purely Holarctic fauna.

Again, some of our North American butterfly groups are probably autochthonous, i.e. originated here. Lacking the evidence of palaeontology we are greatly handicapped in considering this. We must remember how fossil records, reversing earlier belief, showed the horses to have been of North American origin; and the camels to have originated in South America whence they spread, via North America (where they subsequently died out) to the Palaearctic. Most likely of our butterflies to be autochthonous are the Papilio of the glaucus and troilus groups; all Speyeria; and, perhaps, Zerene, Incisalia, Erora, and the Tharsalea subgenus of Lycaena.

Studies of evolution have shown that no population can evolve into a biologically separate species unless it is effectively isolated from any other population with which it could interbreed. Such isolation, be it noted, is a prerequisite but not a cause of evolutionary differentiation. Any study of Palaearctic vs. Nearctic speciation and subspeciation must, therefore, be primarily concerned both with the factors that have isolated Old and New World populations from each other, and also with those which have isolated populations from each other within the regions.

The greatest of these isolating factors was the series of southward extensions of the northern ice cap during the last geologic epoch, the Pleistocene (see Map). At least four such glaciations are known to have occurred, alternating with periods of glacial recession when a relatively uniform, perhaps even subtropical climate prevailed over most of the globe. In North America the earliest of the glacial periods is known as the Nebraskan; the second, the Kansan; the third, the Illinoian; and the most recent, the Wisconsin. More or less corresponding periods have been identified in Europe and, to some degree in northern Asia.



CONTINENTAL PLEISTOCENE GLACIATION OF NORTH AMERICA

Greenland and the other islands were also largely ice-covered. Shore-lines varied greatly due to changes of the sea level. Note the large unglaciated area of Alaska, the Yukon, and probably Siberia.

The ice must have pushed most or all butterflies ahead of it as it moved southward. A very large part of Alaska, from the Bering Sea to the upper Yukon was never, however, ice-covered. Perhaps some species survived here. Certainly many of the most northern species must have managed to survive very close to the edge of the ice sheet, as we see their descendants doing in Greenland today. But their ranges certainly extended far to the south of the southern limit of the ice; and less northern species of course extended still farther southward. Moreover, considerable areas of local glaciation developed in the Rocky Mountain and Sierran systems south of the main ice sheet. These two systems (and to a lesser degree the Appalachian chain) then formed three elevated highways along which the northern species were able to extend farther southward than in the intervening lower areas. The north-south mountain chains also, be it noted, formed barriers across which east-west dispersal of less cold-adapted species could not take place. This is in striking contrast to the effect of the mountains of Europe and Asia, which run roughly across the line of advance of the ice rather than parallel to it.

Then, as the ice sheet receded northward, the biota must have followed very closely. As the cli-

SUBSPECIATION SYMPOSIUM. Klots: Holarctic Butterfly Speciation- cont.

mate became warmer the more cold-adapted species were forced out from the lower and more southward regions first, progressively up the slopes of the mountains as well as northward. On the highest mountains, where the climate still approximates that of the far north, some of even the most Arctic species have managed to survive even to the present time. These are the well known "relict forms". It followed that these mountain populations of far-northern species became, in time, isolated from the northern populations. In many cases, moreover, the mountain populations themselves have become broken up into isolated groups, since the mountain chains are cut across by areas of lowland sizable enough to constitute barriers impassable by the mountain forms. Thus was formed, and still exists, the isolation necessary for the mountain populations to evolve specific or subspecific divergence, not only from their northern "cousins" but also, to some degree, from each other.

A clear understanding of the population isolations resulting from the glaciations is essential to any study of distribution speciation and subspeciation. To this must be added a host of other isolating factors ranging from the east-west variation in humidity, north-south variations in temperature, and local environmental (ecotopic) effects.

Today each of the mountain systems has some of the relict forms. The Rocky Mountain chain, the most extensive and continuous, is by far the richest. The Sierran, with much less extensive Arctic-Alpine areas, and broken by a wide gap between Washington and California, has fewer. The Appalachian, much older and more eroded, has only three areas where true Alpine Zone occurs. These are: the Shickshock Mts. in the Gaspé; Mr. Katahdin in Maine; and the Presidential Range in New Hampshire. The Appalachian has the smallest Arctic-Alpine butterfly fauna of the three.

It will be noted that at least four glacial periods are known. Exact details of the extent of the ice in each are not fully known, especially for the earlier periods; but probably these did not differ in any major way (from the viewpoint of the biologist, at least) from that of the most recent, the Wisconsin. Each of these periods with its following interglacial period was certainly responsible for isolating many butterfly populations. Very possibly some of the more distant degrees of relationship that we can trace today date from one or another of the earlier isolations.

Before considering in detail any butterfly speciation and subspeciation, we should note one other pertinent point. Populations of some of the essentially far northern groups of the Holarctic butterflies have, by adapting to life in a somewhat milder climate, succeeded in surviving and even in extending their ranges far southward at low elevations. Notable among these are species which survive as relicts in the true acid bogs of southern Canada and the northern United States. Since the flora of these bogs is exceedingly like that of the far north, a great many plants being common to both, adaptation by the butterflies has chiefly consisted of evolving the ability to survive during a longer warm season at higher temperatures, and has not involved food plant changes. We thus find such butterflies as Boloria freija and eunomia ("aphirape"), Oeneis jutta Hbn., and Lycaena epixanthe Bdv. and Lec., specific or subspecific offshoots of essentially northern populations, existing well to the southward in isolated populations in bogs.

Limitation of space permits mention here of only a few examples of the various degrees of speciation and subspeciation of Holarctic butterflies that have occurred in North America. Ignorance is also a powerful deterrent; for relatively little attention has been paid to this matter.

Zerene, whether regarded as a subgenus of Colias or as a separate genus, evidently arose from the sex-patched group of Colias, from which it has become greatly differentiated. It has extended its range to southern South America. Perhaps it, as well as the Colias (Scalidoneura) species limited to South America, first became isolated during a pre-Wisconsin glacial-interglacial period. Contrasted with Zerene, Colias meadii Edw. has developed, at most, specific distinction from its Palaearctic sex-patched relatives. Its two more or less isolated populations (the southern meadii and the northern elis Stkr.) are now evolving subspecific distinction from each other. Perhaps meadii first developed specific distinction following the Illinoian glaciation, and its present subspeciation in post-Wisconsin. Similarly Colias behrii Edw. and harfordii Hy. Edw. of California may represent species dating from pre-Wisconsin isolations, the first having evolved from Colias nastes stock, the second from the C. chrysotheme complex. And the C. eurytheme-philodice populations, likewise descended from the chrysotheme complex, and at present vacillating in an indescribable (and insufficiently known) state of partially specific, partially subspecific separation from each other, appear to be specifically distinct from harfordii and presumably likewise from the Palaearctic chrysotheme Esp.

Among our other Colias, the Willow-feeding C. gigantea-harroweri-scudderii-ruckesi populations appear to have evolved as a distinct specific stock with fairly well differentiated subspecies, extending from the Arctic to New Mexico. The Legume-feeding C. alexandra-edwardsii-emilia-christina-krauthii population is certainly specifically distinct; but its two main components, traditionally called alexandra Edw. and christina Edw., are hardly specifically distinct from each other although some definite subspecific distinctions can be traced within them.

The distinctive Colias nastes Bdv. has evolved some more or less clinal subspecific distinctions in North America, but is probably not specifically distinct from Palaearctic populations. The same is true of C. hecla Lefebre and, perhaps, of C. palaeno L. In these species the lack of specific distinctions between Palaearctic and Nearctic populations must be due to a longer period of interbreeding

between the Palaearctic and Nearctic, a process facilitated by their Arctic habitat.

Colias is evidently undergoing some very puzzling changes today. This is commonly attributed to a present rapid rate of differentiation. An alternative hypothesis must, however, receive serious consideration. Perhaps the pre- as well as post-Wisconsin isolation of some of the species was less complete (due to strong flight habits?) or mutational changes during the isolations were less effective, or both. As a result, various populations of the ancestral stocks of the eurytheme-philodice and alexandra-christina complexes split into subpopulations less completely genetically differentiated from each other. And so we see today the results of varying rates of interbreeding as these incompletely differentiated populations come together again. The same situation occurs on a smaller scale in the Limenitis arthemis-astyanax population.

Turning to Boloria, a genus similar to Colias in possessing rich representation in both the Palaearctic and the Nearctic, and also in both far northern and temperate environments, we see a more stabilized pattern. There is, in North America at least, little evidence of such hybridization as we see in Colias. Therefore, we may infer that pre- and post-Wisconsin isolations were more complete. Boloria shows, however, some widely varying degrees of speciation and subspeciation.

Both B. freija Thunb. and B. polaris Bvd. show relatively little differentiation of the Old and New World populations. The range of freija in North America is great, extending all across the Arctic and south in the mountains into Colorado and in bogs into Quebec. Despite this, little subspeciation is evident. The far northern population is distinguishable as the large and dark tarquinius Curtis; and perhaps both natazhati Gibson and nabokovi Stallings and Turner from the northern Canadian-Alaskan mountains represent a similar local subspeciation. Elsewhere no distinct subspecies of freija are discernible.

Boloria titania Esp., eunomia Esp., and selene L. are even more widely distributed in both the Palaearctic and the Nearctic; but in contrast to polaris and freija these species have broken into a great number of subspecies. B. chariclea Schneider of the true Arctic may or may not be considered conspecific with titania, depending on one's tendency to "lump" or "split". But in any case we can clearly place in titania the Nearctic subspecies boisduvalii Dup., grandis B. and McD., rainieri B. and McD., ingens B. and McD., helena Edw., and montina Scud. In eunomia we may place denali Klots, triclaris Hbn., dawsoni B. and McD., laddi Klots, and caelestis Hemming. In selene we may place alboquina Holl., atrocostalis Huard, tollandensis B. and Benj., terra-novae Holl., nebraskensis Holl., myrina Cram. and marilandica A. H. Clark. Of all our species of Boloria, selene has been most able to adapt to more southern conditions, which explains its wide range and has permitted its great subspeciation.

In the frigga group of Boloria some rather more fundamental splits have occurred. In the Nearctic occur four distinct species, of which at least two (and perhaps all four) are endemic. B. frigga Thunb. and B. improba Butler occur in both Old and New Worlds but have, as far as we know (northern Asiatic material is lacking) greater range and differentiation in the Nearctic. B. frigga has at least two northern subspecies, gibsoni B. and Benj. and saga Staud., and a third, sagata B. and Benj. in Colorado. B. improba, a truly Arctic butterfly, has a slightly sub-Arctic subspecies youngi Holl. in North America, as well as the Palaearctic improbula Bryk. B. epithore Edw. is clearly endemic (British Columbia and Montana to California and Colorado). And B. toddi Holl. (=bellona Fab.) ranging from western Canada to New Jersey has, like selene, adapted to a wide climatic range; but unlike selene it shows little distinctive subspeciation. Only two named subspecies are recognizable, ammiralis Hemming and jenistae Stallings and Turner; and the latter is really more of a local form than a major subspecies. Very possibly the four species all attained specific distinction in pre-Wisconsin times.

Only a few of the Holarctic butterflies have been touched upon above. Perhaps, since space forbids more detailed treatment, a listing of some of the other more prominent examples will be of interest, roughly classified as to the degree of differentiation that has evolved between the Palaearctic and the Nearctic populations. The majority of these are, of course, the lowland and warmer climate forms which, I fear, have been most unjustly skimped above.

SPECIFIC DIFFERENTIATION: Papilio polyxenes Fab., brevicauda Saunders, zelicaon Luc., etc.; Parnassius; Anthocaris and Eucloë; Pieris virginiensis Edw., protodice Bdv. and Lec., beckeri Edw., etc.; Coenonympha haydeni Edw.; Cercyonis; Oeneis and Erebia, many species; Euphydryas, Melitaea, and Polygonia; Nymphalis californica Bdv., milbertii Latr., and j-album Bdv. and Lec.; Vanessa virginiensis Drn.; Limenitis; some Strymon; some Lycaeides (e.g. melissa Edw.); some Plebeius (e.g. saepiolus Bdv.); some Pyrgus (e.g. communis Grote); many Hesperia.

SUBSPECIFIC DIFFERENTIATION: Papilio machaon L.; Pieris napi L.; Coenonympha tullia Muller; Oeneis taygete Gey., jutta Hbn., norna, and melissa Fab.; Erebia theano Tausch.; Lycaena phlaeas L.; Lycaeides argyrognomon Bergstr.; Plebeius aquilo Bdv.; Lycaenopsis argiolus L.; Pyrgus freija Warren; Carterocephalus palaemon Pall.; Hesperia comma L.

AT MOST VERY MINOR SUBSPECIFIC DIFFERENTIATION: Nymphalis antiopa L.; Vanessa atalanta L. and cardui L.

As previously mentioned, the route between Alaska and northeast Asia seems to be the only one by which any significant movements of butterfly populations between the Palaearctic and the Nearctic have taken place. There is but little evidence, and that dubious, of any effective direct migrations between Europe and eastern North America. The butterflies of

SUBSPECIATION SYMPOSIUM. Klots: Holarctic Butterfly Speciation- concl.

northwestern North America show, in general, closest relationship to those of northeastern Asia; and the further we trace, south and east in North America and south and west in Eurasia, the greater become the differences from the meeting point.

In making such comparisons one must, of course, be watchful for the possibility, or even probability, of parallel evolution having occurred in both Old and New Worlds, as species became adapted to similar environments in central Eurasia and central North America. A number of such cases of parallelism seem to be discernible. One striking instance is evidenced by the great similarity of Boloria t. titania and B. t. grandis; another by the resemblance of Lycaena p. phlaeas to L. p. americana Harris; and still another by the great similarity in Europe and North America of the more southward subspecies of Vanessa atalanta and cardui and Nymphalis antiopa. Many more such possibilities could be cited.

Detailed studies comparing the Palaearctic and Nearctic butterflies are largely lacking. Such as exist are weakened by our still great ignorance of the Nearctic forms. First we must have studies of these on a far more exhaustive and detailed scale than have been made. We do not yet know even the major subspecific patterns of the majority of our species. There must be far more thorough collecting, and large collections must be gotten together and be made available, on a scale hitherto unknown, to the taxonomic specialist. And the specialist himself must change his ways and, instead of trying to cover all groups in a broad geographic field, must concentrate his efforts on complete coverage of smaller taxonomic groups.

If this is done, there is some hope that in a few generations we may come to know the Nearctic butterflies as well as those of Europe are now known. Of course, the vital annectant area of Asia will very likely continue essentially unknown for much longer. Eventually, let us hope, studies like the present one (which is really but a superficial survey "conceived in ignorance and begotten in haste") may come to have real significance.

IV. SUBSPECIATION IN EUROPEAN LEPIDOPTERA

by Bryan P. Beirne
Systematic Entomology, Division of Entomology
Ottawa, Canada

In a paper of this length it is possible to discuss only briefly and in very general terms a few of the many aspects of subspeciation in the European Lepidoptera. In Europe, most subspecies have developed in populations that were isolated from other populations of the same species by the great climatic and vegetational changes that took place during and since the Ice Age. Conditions appear to have been more conducive to the isolation of such populations in Europe than in North America. The primary reason for this is that in Europe the chief mountain ranges - the Alps and the Pyrenees - run east and west. They, and the ice sheets that developed on them, formed a barrier that prevented populations of some species from retreating southward from north-central Europe as the main ice sheets advanced from the north and as the climate deteriorated. These populations, being cut off from the main populations of the same species that survived in Europe south of the glaciated areas, were able to develop independently. In North America the chief mountain ranges run north and south, so that the Lepidoptera were able to retreat southward along or between them as the ice sheets advanced from the north, and, in general, populations were not cut off to the same extent as in Europe. Because of the directions of the mountain ranges, too, the number of purely mountain species as compared with purely northern or northern and mountain species is probably smaller in North America than in Europe.

During a glacial phase, Europe south of the main ice sheets and north of the Alps and the Pyrenees was inhabited by two main groups of species: first, species that had inhabited the northern regions and the mountains during the preceding temperate phase and that had been driven by the expanding ice sheets from those areas into north-central Europe; and, second, species of which populations had inhabited central Europe during the preceding temperate phase and had been cut off from the main populations by the development of the mountain ice sheets.

In the species of the first group, subspecific variation has developed mainly since the chief ice sheets retreated. As they are species characteristic of cold climates, the climatic amelioration as the ice retreated was the main factor in dividing the range of each into small populations that could develop independently of each other. Some retreated into the mountains, where many of them became divided into small populations, each on a different mountain or group of mountains. The independent development of such populations is particularly striking in Erebia. Erebia tyndarus Esp., for example, has had some 15 described subspecies in the mountains of central Europe. Other species retreated into northern Europe. On the whole, these did not develop subspecies to the same degree as in the mountains. The main reason for this is that habitats ecologically suitable to them extend more or less continuously over large areas in the north, so that the species' ranges are not divided up into isolated populations as in the mountains. Some species retreated both into the mountains and into northern Europe. These are the species that now have the

so-called boreo-alpine or arctic-alpine types of distribution. Some of them developed subspecies independently in both regions. Erebia medusa Schiff. and Dennis, for example, is represented by one subspecies in northern Europe and by at least nine others in the mountains of central Europe.

The populations of species characteristic of temperate climates that were cut off from the main populations of the same species in north-central Europe during glacial phases developed independently during their periods of isolation. As the ice sheets advanced and the climate deteriorated, they were faced with three possibilities: they might die out completely in north-central Europe; they might adapt themselves for life under the new conditions; or they might become confined to those parts of the ice-free area where ecological conditions favorable to them still existed. Most populations probably were forced to take the first course; naturally, the identities of such species concerned unknown.

There is evidence that some populations changed their habits to survive. A number of species are each represented by two races in Europe, one having a wide and more or less continuous distribution, inhabiting woodlands or grasslands, and feeding on woodland or grassland plants, and the other having a boreo-alpine type of distribution and occurring also in the northern and western parts of the British Isles, inhabiting heaths and moorlands, and feeding on heath and moorland plants. In each case, the latter probably represents a population of the species that was cut off in north-central Europe during a glacial phase, became adapted for life in the cold climates and among the heath and moorland vegetation that must have covered much of that region, and then retreated to the areas where such conditions existed when the ice sheets retreated and the climate became warmer. While they were retreating northwards and into the mountains, the other races of the same species that had survived in Europe south of the glaciated areas with unchanged habits spread over central Europe. At present the distributions of the two races of the one species often meet or overlap; but in most instances apparently little or no interbreeding occurs, as they are isolated from each other by the habitat differences. In some instances, they are also isolated by differences in the times of appearance of the adults, as in Hydriomena furcata Thunb., whose moorland race appears about a month before the woodland race. Some of the moorland races differ morphologically from other races of the same species and on morphological grounds are regarded as good subspecies; others differ but slightly and not constantly. In the preceding, the term "race" is used for convenience. It would be perhaps more correct to consider the moorland races as distinct species, at least in some instances.

Most of the populations that survived a glacial phase in north-central Europe did so by becoming confined to those areas where ecological conditions favorable to them still existed. The chief area of refuge for many of the species appears to have been land between the present south coasts of the British Isles and the north coast of France. This area was land at that time because of the lowering of the sea level that took place during glacial phases as a result of the locking-up of great quantities of water in the ice sheets. The climate there was less cold than elsewhere because of the proximity of the ocean, as well as because of the distance of that region from the ice sheets and its low altitude. While they were isolated there or in adjacent ice-free regions, populations of many species developed subspecific characters. When the ice retreated and the climate gradually became warmer, these populations spread out from their areas of refuge. At the same time, other populations of the same species, which had survived in Europe south of the glaciated areas, spread northwards and westwards. Eventually the ranges of the two subspecies of each species met. Interbreeding then took place as, unlike the moorland races described above, in most instances the two were not isolated from each other ecologically. The invaders from the south usually overwhelmed the descendants of the relict populations, and the latter now survive only in geographically isolated regions into which the former were unable to spread in any numbers. In some instances, the invaders from the south did not reach western Europe until after the British Isles had become separated from the European mainland by the sea. These species are now represented throughout the British Isles by descendants of the relict populations. Bena prasinana subsp. britannica Warren is an example. In other instances the new invaders reached Great Britain but not Ireland or the islands of Scotland, so that the species are represented by descendants of the relict population in the latter areas but not in Great Britain. The satyrid butterfly, Maniola jurtina L., is an example, its relict population being represented by the Irish subspecies iernes Graves, the Hebridean subspecies splendida B.-White, and Scilly Isles subspecies cassiteridum Graves. That the two subspecies of the one species are interbreeding where their ranges meet on the one land is shown by the relatively narrow zone of intergrading between the two in such cases. For example, intermediates between Aricia agestis subsp. agestis Schiff. and artaxerxes Fab. are found where the ranges of the two Blues meet in parts of western Scotland.

Apparently some relict populations were forced to become inhabitants of the sea coasts to survive a glacial phase in the region of the British Isles, and have retained their maritime habits to the present day. Other populations of the same species, besides usually differing morphologically, inhabit inland localities on the European mainland, many of them being characteristically mountain species. Hadena andalusica Staud. is an example. However, as there is at present no known definite instance where the ranges of the two populations of such species meet or overlap, it is not possible to state whether or not they are ecologically and reproductively isolated from each other, and therefore whether or not they should be regarded as subspecies or as distinct species. It is possible that cases parallel to these may occur on the coasts of North America. Investigation of this is desirable as it might throw more light on the origin and status of such subspecies.

This is Contribution No.2785, Div. of Entomology, Science Service, Dept. of Agriculture, Ottawa, Canada. The author is Agricultural Research Officer.

V. SUBSPECIATION IN THE MICROLEPIDOPTERA

by Eugene Munroe
Systematic Entomology, Division of Entomology
Ottawa, Canada

It is well known that in such groups of animals as birds, mammals, and butterflies the patterns of speciation are largely geographic, and that we can demonstrate every transition from minor geographic differentiation within a single species to the broadest cleavage between geographically representative species or even species groups. Such authors as Rothschild and Jordan (1903) and Mayr (1942) have emphasized the significance of geographic speciation, and there is no doubt that this process has been of dominating importance in the evolution of the higher Lepidoptera. My own work on West Indian butterflies has, for example, led me to adopt hypotheses that closely resemble those Mayr has advanced to explain the distributions of South Pacific birds.

In such groups of microlepidoptera as the Pyralidae, similar patterns are easily discovered. Contrasting the European with the American fauna, we see in some cases a simple subspecies difference, as in Crambus hortuellus (Hbn.) or Pyrausta funebris (Strom.). In other instances there is a species difference, as between Crambus dumetellus (Hbn.) and U. rubigalis Gn. In still more extreme cases a species group in Europe appears to represent a species group of North America, for instance, the Pyrausta aurata (D. and S.)-purpuralis (L.) group of Europe as opposed to the P. ochosalis Dyar-generosa (G. and R.)-tuolumnalis B. and McD. group of America. On the other hand, some species of Pyralidae do not differ appreciably from North America to Europe. Examples of this kind increase in numbers in higher northerly latitudes: we may cite Scoparia centuriella (D. and S.) or Udea inquinatalis (Zell.).

Subspeciation may of course also occur in a much smaller field. Thus Pyrausta unifascialis (Pack.) has three subspecies, one in northeastern, one in northwestern, and one in southwestern North America. Pyrausta perrubralis (Pack.) also has three subspecies, one east of the Rockies, one in California, and one on Vancouver Island. Northern as against southern subspecies also commonly occur, and the dividing line may be situated at different latitudes: in Crambus albellus Clem. near the Canadian-U.S.A. border, in Phlyctaenia extricalis (Gn.) in the middle states, and in Polygrammodes flavidalis (Gn.) in Florida. Other, less typical, patterns are found in Pyrausta napaealis (Hlst.), which appears to have one subspecies on the coast of California and another in the interior, and in Loxostege albiceralis (Grt.), which has one subspecies in the western United States and another in Florida.

Geographically representative pairs of species can also be found in North America, e.g., Oneida lunulalis Hlst. in the eastern part of the continent, and O. luniferella in the west. Even more interesting are pairs or sets of species the distributions of which suggest that they have until very recently been geographically representative. Mecyna submedialis (Grt.) ranges from eastern Canada westward to the Rockies; on the Prairies its range overlaps that of the closely allied M. mustelinalis (Pack.), which, in turn, extends southward to southern California and Arizona, where it is sympatric with a third member of the complex, M. luscitialis (B. and McD.). This combination of ranges strongly suggests that the three species were originally geographically vicarious, and that they have subsequently become partially sympatric through local extensions of range. Another interesting case is that of the pair Pyrausta ochosalis Holl. and P. tuolumnalis B. and McD. The first-named species ranges east and west across Canada from coast to coast; the range of the second lies along the Cordillera, from California to the Yukon and Northwest Territories, transecting the range of P. ochosalis at right angles.

Thus, in the Pyralidae, as in the macrolepidoptera, we see every stage in the cycle of geographic subspeciation and speciation widely exemplified. Had we sufficient knowledge of tropical insular faunas, there is no doubt that we could assemble far more impressive and convincing series than we can do in the relatively unfavourable environment of the temperate continents. There is certainly little doubt that geographic speciation has been of considerable importance in the evolution of the Pyralidae.

Now, it is worth noting that the Pyralidae stand, both phylogenetically and biologically, at a level intermediate between that of the macrolepidoptera and that of the true microlepidoptera. It is possible that they occupy a similar position in the field of speciation mechanics.

The examination of a large collection of North American microlepidoptera shows one thing very strikingly. This is that, except in the Pyralidae, and in a few families such as Cossidae and Hepialidae that include individuals of large size, geographic variation within species is, at least so far as can be determined by gross examination, almost negligible; this appears to be true also in important groups of the Pyralidae.

I am able to give a few examples of geographic variation in microlepidoptera argentialbana Wlshm., from the Prairies, with its larger and more heavily maculated subspecies britana McD. in British Columbia; Epinotia hopkinsana Kft., from British Columbia, with its subspecies cupressi Heinr. from California. A somewhat different case is that of the well-known Archips persicana, which in western North America has what appears to be a dimorphic form, in which the costal spot, normally triangular and contrastingly white, is reduced to a narrow, almost concolorous quadrangle. I repeat, however, that these few examples have been selected, after considerable search, from among a great mass of species that show no evident geographic variation.

Not only do most species of microlepidoptera lack obvious geographical variation, but they also have another interesting group characteristic: they are in a very large part monophagous or narrowly oligophagous. This introduces a further generalization: whereas in many groups of animals very closely related species tend to be allopatric, in the microlepidoptera this does not seem to be the case, but instead closely related species tend to be sympatric, being distinguished primarily by different host plant preferences. We do not have enough definite information for the assembly of statistics, but certainly the host-plant species pattern is dominant in a wide range of groups, of which I may mention as examples Acrobasis, Coleophora, Lithocolletis, Nepticula, and the Aegeriidae, among many others.

Examining this tendency in detail, we find that some specific examples have been well investigated. The work of Thorpe (1929) showed the existence of at least two morphologically similar, but biologically distinct, forms of the European Hyponomeuta padella L. These differ in food plant requirements, and behave in mating and oviposition as discrete populations. Although Thorpe, impressed by the morphological similarity of the apple-feeding and hawthorn-feeding populations, classed them as "biological races" of the single species H. padella, the evidence that he presents leaves no doubt that they are in reality distinct species in the Dobzhanskian or functional sense. Somewhat more subtle problems are suggested by Thorpe's remarks on some of the other members of the H. padella complex.

A more difficult situation certainly exists in the budworms of the genus Choristoneura. As Freeman (1947) has noted, there are in eastern Canada two species of this genus which are barely distinguishable on morphological characters, but which differ sharply in seasonal periodicity and also in their food plants, one being the notorious spruce budworm, the other being a pest of jack-pine. So far the situation does not differ greatly from that found by Thorpe in Hyponomeuta. In British Columbia, however, there exists a population that appears to be intermediate in morphological characters between the spruce and jack-pine budworms of the east; this intermediate population has been reported from spruce, pine, and Douglas fir.

Even finer degrees of difference have been investigated in the codling moth, Carpocapsa pomonella (L.). It is well known that in California, southern Europe, and elsewhere, the codling moth attacks not only apples and other fruits, but also walnuts. In California, this habit is believed to have been adopted by the species at a time subsequent to the establishment of the insect there as a pest of apples. Accordingly the possibility has been investigated that two genetically distinct and perhaps reproductively isolated populations of the codling moth exist in California. The results of such investigations have up to the present time been equivocal or negative (Boyce, 1935; Smith, 1941, Basinger and Smith, 1946). A more interesting case was, however, reported by Armstrong (1946). This - the apparently local origin of a univoltine strain of C. pomonella in an isolated pear orchard - illustrates very well how microgeographic differentiation, aided by a tendence to host specificity, may play a part in the evolution of microlepidoptera.

In the microlepidoptera, then, we have a reversal of the geographic speciation pattern that is so evident in such groups as the macrolepidoptera, the mammals, or the birds. With our present knowledge we cannot say that the different pattern is the result of a different mechanism of speciation; but this possibility certainly ought to be investigated. To try to anticipate the results of such an investigation would be premature, and I have no wish to do so. I should like, however, to mention one or two points that may have a bearing on the matter.

This pattern of sibling species, apparently isolated by host preferences, is by no means confined to the microlepidoptera, but on the contrary appears in a wide variety of groups, among which I may mention the Chrysomelidae and other phytophagous Coleoptera, and the various phyla of parasitic helminths. The thing that all these groups have in common is that many of their species exhibit a narrow and rigid host specificity, which is only under exceptional circumstances broken down. Experimental studies have shown that transfer from a normal to an abnormal host is usually accomplished only in the face of a serious selective disadvantage; the typical course of events is for a high initial mortality to be followed by the establishment of progeny of the few survivors, as a strain adapted to the new conditions. No doubt adaptive change might proceed rapidly in the new and strange environment, and within a few generations it might become hard to make the transition back to the original host. If the odds against establishment on a new host are fairly high, this provides the basis for a mechanism that would isolate from the parent stock any strain that does succeed in making the change.

Another theoretically possible basis for the sympatric development of host-specific strains is provided by the "host-selection principle" of Hopkins (1916); and also Craighead (1921). The principle postulates that the species chosen by a female insect as a host for oviposition is in some cases determined by the identity of the host on which that female fed in the early part of her life. The extent and regularity of the application of this principle have yet to be investigated. If its validity should be established, however, Hopkins' principle would constitute a second potential isolating mechanism between strains of a species on different host plants.

Yet a third possibility is that of a sort of micro-geographic differentiation, such as was suspected by Armstrong in the case of the pear-orchard strain of the codling moth, mentioned above. Some combination of these processes, perhaps with the addition of others whose existence is not yet suspected, may suffice to explain the speciation patterns of the microlepidoptera and similar groups.

Certainly, whatever the eventual conclusion may be, the possibility of speciation governed primarily by host-plant isolation deserves attention. Nor

should the evolutionary patterns of the microlepidoptera be studied as though they were the anomalies of some obscure and insignificant group: there are more species of microlepidoptera recognized in North America than there are subspecies of birds and mammals combined; and there is no reason to suspect that the proportion will prove atypical when our knowledge is extended to the world fauna.

References

Armstrong, T. 1946. "Differences in the life-history of codling moth, Carpocapsa pomonella (L.), attacking pear and apple." Can. Ent., vol.77: pp.231-233.

Basinger, A.J., and H.S. Smith. 1946. "Notes on the time of emergence, longevity, and oviposition of codling moth from walnuts, apples and pears." Calif. Dept. Agr. Bull., no.35: pp.37-38.

Boyce, A.M. 1935. "The codling moth in Persian walnuts." J. Econ. Ent., vol.28: pp.864-873.

Craighead, F.C. 1921. "Hopkins Host Selection Principle as related to certain cerambycid beetles." J. Agr. Res., vol.22: pp.189-220.

Freeman, T.N. 1947. "The taxonomic and economic approach to an entomological problem." 77th Ann. Rept. Ent. Soc. Ont.: pp.8-9.

Hopkins, A.D. 1916. "Economic investigations of the scolytid bark and timber beetles of North America." U.S. Dept. Agr. Program of Work for 1917: p.353.

Mayr, E. 1942. Systematics and the origin of species. Columbia Univ. Press, New York.

Rothschild, W., and K. Jordan. 1903 "General subject", in "A revision of the lepidopterous family Sphingidae." Nov. Zool., vol. 9 (suppl.): pp.XV-CXXXV.

Smith, H.S. 1941. "Racial segregation in insect populations and its significance in applied entomology." J. Econ. Ent., vol.34: pp.1-13.

Thorpe, W.H. 1929. "Biological races in Hyponomeuta padella L." J. Linn. Soc. Lond., vol.36: pp.621-34.

This is Contribution No.2793, Div. of Entomology, Science Service, Dept. of Agriculture, Ottawa, Canada. The author is Agricultural Research Officer.

VI. THE SUBSPECIATION OF SPEYERIA ATLANTIS

by L. Paul Grey
Lincoln, Maine

[The Symposium paper on the subspeciation of Speyeria atlantis (Edw.) was presented with the aid of illustrative Kodachrome slides showing examples of the more distinctive geographic races and intermediates. Bereft of extensive illustration a somewhat different approach becomes necessary in preparing a report for News readers.]

The tangled skein one has to deal with in studying and discussing a widely dispersed and tremendously variable species like atlantis is a matter which does not lend itself readily to purely verbal illumination, unless the reader himself can supply an acquaintance with the material and the problems. However, since so little is available in the literature to summarize what appear to be significant intergradations within the Speyeria complex, a summary of the continental gradients of atlantis may be of interest to some, if not wholly lucid to the lay reader. Statements as to "what", "where, "in what direction", and (incautiously, perhaps) occasionally a "why" and "how" are given below, representing my personal conclusions regarding what atlantis is and what it does in North America.

One might say first that this problem is indeed an ecogeographic one; for, unfortunately, the only known structural characters which are helpful in delimiting this species (uncus of male genitalia tapers gently to a ventrad-curved claw without pronounced ventral excavation in the lateral outline; female bursa simple, long ovoid, not compound) fail to separate atlantis from its closest relatives. By genitalic grouping atlantis falls in the callippe series which also includes zerene (Bdv.), coronis (Behr.), egleis (Behr.), hydaspe (Bdv.) and mormonia (Bdv.). [The species edwardsii (Reak.) falls here, also, but is distinct by reason of the abnormally lengthened superior valve process. One might pry off mormonia, too, because of the delicacy of the male venation: this last character is minor and yet it is tangible, ranking as a good morphological feature.] But even if the student learns to use these helpful structural differences, it is discouraging to have to admit that being left with atlantis, callippe (Bdv.), zerene, coronis, egleis and hydaspe ends the key with the major difficulties in Speyeria still unresolved. Informed naturalists know that these species occur with intricate overlapping at the same flower heads while maintaining everywhere a discrete existence in nature in gradients recognizably different from each other, so the matter of defining the valid species becomes one of following these gradients here, there, and everywhere they go, seeing now this species, now that, varying here gently, there abruptly, dependent upon geography and accompanying ecology. And so, to know species in Speyeria one must learn both their local limitations of individual variation within colonies and also their continental aspects of distribution and fluctuation from this race to that, with all that is thereby implied of the necessity to have good geographic coverage so as to be able to see the intergradations between regionally distinct subspecies.

Quite fortunately, atlantis is classically and nymotypically from the East, where it can have coexistence only with the species of the distinctive

Semnopsyche complex [cybele (Fab.), aphrodite (Fab.), and diana (Cram.)] and with the gaudy and altogether unique idalia (Drury). So, we can start with something that is beyond all doubt a valid species, and we find in eastern material a clue to further delimitation, namely, an ecological peculiarity: this species is partial only to the Canadian Zone, being abundant in a continuous geographic sense only in northern New England and Canada, while becoming discontinuous along the Appalachian "islands" southerly to Virginia.

The collector with abundant material finds that eastern atlantis varies considerably more that is generally known. Since the eastern series has absolute characters to separate it from sympatric congeners the variation can be studied as an index of the amount of color fluctuation to expect for a given amount of ecogeographic differentiation. That is to say, in the East, Canadian Zone conditions are rather monotonously similar from Virginia to Labrador and from Cape Breton to eastern Manitoba if judged by the standards one has to use in the West where, in a day's drive, ecologic contrasts (greater than anything known in this huge Eastern territory) ranging from Sonoran to Alpine may be encountered. Of course there are considerable local differences in the East, and yet we have no really severe natural barriers nor abrupt discontinuities. Thus, from the viewpoint of "gene flow" it is not surprising to find that eastern atlantis is more remarkable for similarities than for differences. There is a gradient ("cline") northerly toward brilliancy of silver and increased melanism, along with diminution in size. The Newfoundland material shows some constant differences [canadensis (dos Passos)]; the Shick-Shock (Quebec) colonies are perhaps recognizable as a minor strain; Labrador, Quebec, Ontario, and central Canadian localities support considerable local discal melanism [hollandi (Ch. and Ch.)] but these are not sharply different races.

There are four characters by which eastern atlantis may be seen as a rather homogeneous population with geographic opportunities for genetic interchange so that "wild" mutations have been sifted out and kept within bounds by selection operating under similar conditions. These characters are: (1) constancy of silver: no unsilvered Eastern individuals are known; (2) constancy of dark wing-borders above, heavy and fairly solidly black; (3) relatively narrow limits of variation of the band in the secondaries below, with no outstanding changes in color or encroachment of suffusion; (4) fairly stable coloration of the disk of the secondaries below, this being notoriously variable in the genus: in eastern atlantis the disk does not vary extensively and can be described quite briefly under only three "lines of departure", these being toward a reddish brown, a blackish brown, and an olivaceous overcast.

It has been known for many years that certain individual Colorado specimens looked so exactly like Appalachian individuals of atlantis that nobody, not even the most expert, could tell them apart except on the basis of the locality labels. In this generation a combination of events has lead us to accept the idea that atlantis does indeed occur in Colorado. Since this is a crucial point (once we have a beachhead in Colorado the variation in and leading out of that state gives us the keys to the continent, so to speak), further elaboration is in order. The principal stumbling-block is that in this western state the web of variation fanning out from the atlantis-like types leads in final phases to insects a world removed from anything ever seen in the East, from brilliant silver to no silver at all, from wide, pale bands to wholly suffused secondaries, from light bright reddish to dark brown and to sordid dark brick-colored disks, from heavy dark borders above to borders with scarcely any suffusion in the interspace between marginal lines.

The first requisite to understanding these appalling variations, material taken in quantity from a large number of spot localities, has only been available in recent years, and at the same time the factual background for a philosophy to rationalize these differences has been slow in building up through the synthesis of recent studies in genetics, ecology, and systematics. In Colorado, and in the other Mountain States where variation in Speyeria is greatest, there is a huge area of Canadian Zone "islands" chopped up by a multitude of barriers of various strengths. Here, the potentialities for dispersal of atlantis are limited not only by its zonal preference but also by its peculiar "stay-at-home" habits which many students have remarked upon. Although a robust butterfly and of vigorous flight it does not stray around in anything like the manner in which the vanessid butterflies, for example, are known to do. This whole region is ideal for the development of local divergences in a butterfly with this sort of behavior. At the same time the isolations are rendered imperfect because the barriers are not so severe but that we may allow for occasional windblown strays and accidentals. These intruders no doubt act as distributors of the small mutations constantly being fixed by selection pressure in the various partially isolated strains. Thus we have it that the "pot is kept boiling", and boil it does, as the Speyeria student is well aware. This is not a complete explanation of the "why" but it is a simplified rationalization which seems to stand the test of examination from various angles. For example, as atlantis is followed out into regions where ecology and geography differ by giving fairly complete or absolutely complete isolation or to extensive areas where conditions of environment are everywhere similar, there is a sharp drop in the extent of variation displayed by the material. This suggests that when left severely alone the western populations thus isolated settle down to a fixity of type comparable to that achieved by the Appalachian spur.

For whatever the reasons, it can be shown that from spot localities in Colorado series of atlantis give all intermediates between the various "forms", with, for example, full intergradation through silver to no silver, wide bands to suffused bands, brown disks to brick-colored disks, and so on. And when, as in the Front Range, we trace these combinations leading through electa (Edw.) into hesperis (Edw.), or, as in the Grand Mesa area, from electa through to nikias (Ehr.), or to various unnamed ex-

SUBSPECIATION SYMPOSIUM. Grey: Speyeria atlantis- cont.

tremes, we are establishing the relationship of an "atlantis" color form to color forms significantly different, from which we can "step again" even farther as we tour the West.

In going Southwest, through southwestern Colorado into New Mexico and Arizona, we find the material varying away from the dark Front Range (hesperis) strains, encountering reddish, light-colored brilliantly silvered phases (nikias). We cannot expect a perfect linear gradient. Occasionally a nikias crops up far to the north in a population predominantly of the hesperis type, with the converse being true, also. We find, dependent on where we collect in and around the melting-pot area: (1) regionally typical color forms within which other phases occur sporadically; (2) a rough balance between two dissimilar types; and (3) continuous clinal variation from Alpha through Omega. From a situation of this sort the systematist retreats as gracefully as possible and is happy to let the geneticists take over.

With dorothea Moeck in the Sandia Mountains of New Mexico we first encounter the consequences of the geography as the Canadian Zone "islands" become wider separated with increasingly severe barriers. Down the San Juans, Sangre de Cristos, and other southerly reaching spurs of the Colorado Rockies, variation progresses but carries some genes from the north. The race dorothea strikes the eye with the impression that here there is but little contact with the things which have gone before. Instead, although dorothea is a "something" in its own right, we can in selected individuals match (fairly well although not absolutely) the other "something" in Arizona which collectors know as nausicaa (Edw.), and of the Colorado types can match only selected southern Sangre de Cristos nikias. No hesperis of "atlantis" are seen; this transition took place farther up the line. Typically, the nausicaa down at the end of this gradient are distinctive, with bold reddish color above (matched in dorothea), large size (also matched in selected dorothea) a slightly more falcate male primary and a secondary disk sprinkled with an overlay of violaceous scaling, and are notably free of extremes of variation (although one specimen is known, data beyond suspicion, to show that even as far away as in Arizona the "atlantis"-like coloration has not been completely submerged).

A further indication that nausicaa affiliates with atlantis is seen in the Grand Canyon area subspecies schellbachi Garth, recently named. This is intermediate from nausicaa to chitone (Edw.), the latter being a southern Utah washed-out version of hesperis with quite evident relationship back to the Colorado storm center. It is probable that the Southwest still holds some secrets, but the material now available from scattered colonies tells us a story of isolated microsubspecies through which nausicaa of Arizona anchors firmly to a gradient stemming from Colorado atlantis. A lot could be said here which must be omitted for reasons of space. Let it suffice that my personal feeling is that these isolated Southwestern "abnormalities" are exactly what we might expect from considerations of past and present geographic history, ecology, and genetic theory. Probably much of the subspeciation in Speyeria as we know it today has come about in the past ten thousand years consequent upon the last glacial retreat and the climatic readjustments in its wake.

Leaving the Southwest, and before picking up another major line of dispersal from the Colorado center, it is perhaps best to dismiss a few "dead ends". The material from the Nebraska canyons is similar to hesperis and ends against the barrier of the Plains. The South Dakota Black Hills, isolated as they are by bad lands, have a population similar to hesperis, but in series fairly distinct. Here again, as in Colorado, eastern-type individuals occur as rarities in colonies overwhelmingly Western in facies. This happens over a surprisingly large area, from New Mexico to Idaho, and if we try to make a separate species out of it it certainly does not accord with the way argynnid species vary, skulking along with various dissimilar races all over the map. This Appalachian phase is common is some parts of Colorado, but in some places it is very rare and at the same time very different from the associated "atlantis" variation. It would seem that the most plausible explanation is a genetic one, i.e., that the particular combination which we term "atlantis" now and again breaks through the odds built up against its appearance in the various partially separately evolved gene-systems of Western strains. In any event, the Black Hills series, even with the telltale Eastern phases removed, still show excellent relationships back to the Colorado series.

The Plateau and Great Basin gradient west from Colorado works away from hesperis, varying principally toward pallidity. The changes in Utah are not radical; affinities are obvious. In Nevada the main-traveled highways cross the ranges in passes too low for atlantis. It is very likely that if these ranges can be tapped at the 9-10,000 ft. elevations we will come into knowledge of something new and strange. Certainly the ultimate, far beyond what one could reasonably expect even in Speyeria is achieved in the East Humboldt and Ruby Ranges in the astonishing race recently named atlantis greyii by Moeck. Here is a population with very little left to show its tie back to mother atlantis. Now and again one finds a specimen brown enough to match Utah material, by selecting the most pallid individuals. The average is unbelievably pallid, resembling Utah S. zerene platina (Skin.). [We must keep our species and races in mind and remember that by the time zerene platina gets out in the Rubies it is yclept zerene cynna dos P. and Grey and is analogously pallid, is in fact, in this same locality with greyii the absurdly extreme end of the zerene possibilities, in just the same fashion that atlantis here goes off the deep end toward unrecognizability.] It is probable that correlation between variability and degree of isolation, the "Sewell Wright effect" of "drift" in small populations, is here as well demonstrated as one could rightfully expect.

Starting anew from Colorado and skirting west of the Divide toward the Northwest, we can follow another long and interesting gradient. Taking a sample from the Teton Mountains in Wyoming we find that we can match selected Colorado and Wyoming individuals but that the drift is away on a fresh slant. Sampling again in the Targhee National Forest region of Idaho, it will be found that it is easy to match the Teton Mountain individuals but increasingly difficult to find a good "hesperis" in what is still rather wide variability. And, again, at the other extreme of the Targhee gradient it is not difficult to pick out specimens which we meet as a predominating type in the Sawtooth Mts. And once we are in the Idaho Sawtooths our catch is unmistakably sicklied o'er with the aspect which in Oregon we call dodgei (Gund.) and which when we find it in the Sierra Mts. of California, only a trifle lighter and redder, we recognize instantly as the classical irene (Bdv.). Yes, it is a long jump from irene to hesperis, and the end products are different appearing insects. Also, along the way, the variation is simmering down and achieves in the end a fairly constant type in the Sierras from which the wild mutants have been weeded out, just as has happened in the Appalachians and in the Far Southwest. The thing in the Tetons, recognizably different from hesperis (generally unsilvered, much band suffusion) the student will see relates to hesperis by reason of the outcrop of numerous "Colorado-like" forms at one end of the gradient. The other end of this tetonia dos P. and Grey gradient ties in similarly with the eastern Idaho variation. Once we get to viola dos P. and Grey in the Sawtooths, as has been said, it takes no skilled eye to see where we are being led.

Since we first called attention to the intergradation from hesperis to nausicaa and from hesperis to irene, a few years ago, students have been quick to see and admit that however these spectacular Southwestern and Northwestern divergences may wear their hue with a geographical difference, their ties back to mother atlantis are really excellent. It is when we turn northward on the last lap to gather up the last major dispersal, that the plot really thickens and we may find some students unwilling to go along with our ideas. Here, taking the end products, we find the horrible situation that in the Manitoba Riding Mountain area there is a very light and rather small extreme of the prairie lais (Edw.) and that we propose fitting this dennisi (Gund.), so-called, into our motley array stemming from hesperis. Also, to make it really interesting, along with this dennisi in the Riding Mountains, partly distinct in ecology but overlapping at the same flower heads we meet again with eastern atlantis in the dark phase hollandi! How can we account for this?

Let us turn west from Manitoba, sampling the prairie lais as we go, finding them a trifle larger and darker in Saskatchewan, still darker in Alberta. But see what happens when we hit the Rockies and again at the northern prairie fringes and in general whenever we get to a fringe of the extensive lais population: the lais elements stay with us, in occasional specimens, but we are being deluged with forms which look intermediate toward atlantis and now and again with specimens which could have been taken in the Catskill Mts. This story is altogether too long to tell in detail here and we still do not have enough material to be sure of our facts. The problem of understanding which distinct strains we have funneling into and around the periphery of the Canadian prairies will keep us busy for another generation at least. Where do they hybridize, where do they keep distinct, what are the mechanisms at work? A look at the map should convince one that there is a lot of geography involved and a thought about genetic processes makes us realize the complexity we recognize but cannot yet describe with confidence. We see too many hints of overlap, which cry too loudly to be ignored. One thing does stand out rather clearly, that the variation in northern Montana and on to the Banff region in Alberta suggests very definitely a gradient from hesperis to lais, one which no fair-minded observer with extensive material could deny. It looks as though the lais of the prairies was an end-product in a specialized type of Canadian Zone in which hesperis mutated as it came up behind the glacial recession. Perhaps it practiced with a bit of pre-adaptation in camas prairie pockets along the way, as suggested in the intermediate Montana series.

But how can we explain away the coexistence of dennisi with hollandi in Manitoba; can we have two subspecies in one place? Certainly the rather extensive material studied from the Riding Mountains suggests that hybridization does not occur between these forms, so far as we can guess from dried material. It would be but one more in a long and ever-growing list of known "ring distributions" if we conclude that the Appalachian spur, isolated by the warming of the Mississippi Valley from the Rocky Mountain stem, has worked north and west to this reunion with its kindred. These kindred have apparently similarly followed north and east, where Canadian Zone has become established and where recent separating water-barriers have dried away to permit this meeting of end-products from East and West. Apparently the genic build-up has gone to the point where the twain will not now mingle although through long series of intermediates, going back to the Appalachians and back to the Colorado Rockies, we can end up with individuals inseparable to the eye.

Of course, we are finding out things all the time which may shed light on our troubles. The light prairie lais type goes down the Columbian Plateau into Idaho, where from Genesee we have series similar to dennisi not too many miles away from mountains where viola is a subspecies in another dimension, so to speak. And again, Hopfinger, at lower elevations in the Cascades, not a long distance from dodgei country, turns up individuals reminiscent of Colorado hesperis (!) and occasionally one light enough to match Canadian lais. It is questionable if these "lais" colonies would hybridize with the dodgei-viola mountain cline, even if geography and ecologic preference would permit, which in this case they do not. Students of North American butterflies are just beginning to realize how irreversibly and how far along the path toward a separate evolution the subspecies of polytypic species can drift with the aid of isolation and resultant

SUBSPECIATION SYMPOSIUM. Grey: Speyeria atlantis - concl.

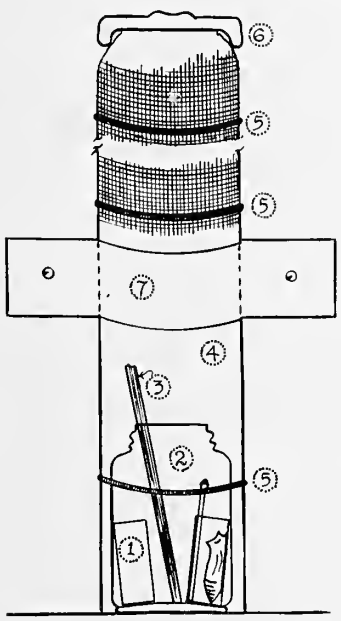
slight changes in genetic constitution.

For the facts as we know them now, Occam's razor seems to be our best interpreter, cutting through to accept the simplest explanation consonant with our material and with the geography. We do find a welter of variation wherever barriers are sharp and yet not severe enough to prevent their being breached often by strays, and we find that from a Cordilleran center where variation is greatest we lead out to divergences and end-products which have little conspicuously in common with "atlantis". So, this butterfly shows us both the results of intermingling strains and of divergency. But the assumption that this is a continental species is a simple one and seems to cover the field, allowing for everything. If we find that the simple premise leads to elaborate conclusions, or even to spectacular things like ring distributions, it may be because the story of subspeciation is intricate and wonderful in many ways which the earlier workers never suspected. Nevertheless, the material we have is so varied, and is at the same time so intermeshed, that it seems presumptious to suppose that future explorations will have nothing to add in the way of novelties, intermediates, and modified theories.

AN APPARATUS FOR INCUBATING LEPIDOPTEROUS LARVAE OR PUPAE IN NUTRITION AND ENVIRONMENT TESTS

by P.H.H. Gray
MacDonald College
Quebec, Canada

The following description of apparatus applies to incubating pupae of Papilio ajax L. (= polyxenes Fab.). It can also be used for rearing larvae. The parts referred to by number are shown in the diagram.



Each pupa is detached from its place by cutting through the girdle and the cremastral silk and is placed in a 'homoeopathic phial' (1) measuring 1 3/4 by 5/8 inches. Seven of these phials will occupy a jar (2) of 6 fluid ounces capacity, 4 inches high (outside) with mouth 1 1/2 inches diameter (inside). The phials should be inserted or removed by means of wide curved forceps. A narrow strip (3) of lath or pasteboard, 1/2 to 1 inch wide and 5 inches high, must rest between the phials to give the emerging adults a rough surface to grip on their way up.

The jar is to be surrounded by wire gauze (fly-screen), rolled to make a cylinder (4) 3 inches in diameter and about 18 inches high; the cylinder is made to keep its shape with three elastic bands (5). At the top the cylinder should be compressed to a diameter of about 2 1/2 inches, to support the loose lid of a quart 'sealer' jar (6) so that it overlaps the wire. Each cylinder must be attached loosely by a broad paper band (7) held by thumb tacks to a board or the edge of a table, so that it can be slid up and down, operations that must be done to remove the jar for recording from which pupa an adult has emerged.

The butterfly climbs to the top. A cylinder of 3 to 2 1/2 inches diameter is recommended for experiments with Papilio ajax, wide enough to enable the wings to expand fully and narrow enough to discourage fluttering. Chilling also discourages fluttering.

For rearing larvae, the jars have a wire gauze cover through which, by enlargment of holes, plant stems are passed into water or solutions being tested. The plant should be pulled down from above by the stem into the cylinder, the lower 4 inches of stem being free of side twigs so that it can pass through the gauze cover; pushing the plant upwards tears or bruises the succulent leaves and twigs.

The following advantages may be claimed for this kind of apparatus. Jars of these dimensions do not occupy much space. They can be closed so that the pupae can be incubated under controlled relative humidities, or exposed to the influence of gases or volatile chemical compounds, or to different temperatures; after the required intervals of time the jars can be placed in the cylinders. For controlled humidities the operative fluids (e.g., KOH solutions of known specific gravities) are placed in the jar; a platform of glass-wool or beads can be used to support the phials. One advantage of such an apparatus for rearing larvae is that the frass falls to the gauze cover or to the base where it can easily be removed for analysis or any other purpose.

The entomology of Holland and Indonesia suffered a great loss with the tragic death of Prof. Dr. L.J. Toxopeus, who was overrun and killed by a motor car in Bandung, Java, on 21 March 1951, 56 years of age.

In him we lose one of our best entomologists, an eminent lepidopterist who was an authority on the fauna and the zoogeography of Australasia, a specialist of Rhopalocera, especially of Lycaenidae of that region, an unrivalled collector, the soul of the Entomological Society in Indonesia, and the author of numerous publications on Lepidoptera.

Lambertus Johannes Toxopeus was born on 8 September 1894, in Toeban, Java, of Dutch parents. He studied biology at the University of Amsterdam. The studies of the zoogeography of the Malay Archipelago by the eminent Amsterdam zoologist, Prof. Max Weber, made a deep impression upon him and influenced the choice of his specialization: zoogeography of the Australasiatic region tested upon taxonomy and distribution of Lepidoptera. Long before the taking of his final degree he had already taken part in the Expedition to Boeroe (Moluccas) in 1921, as leader of the Zoological-Botanical section; his zoological collections provided material for a great number of papers published in Treubia under the joint title "Fauna Buruana" running up till now. In 1923 he was appointed teacher in Natural History at Amsterdam. In 1930 he took his D.Sc. degree on a thesis titled "The Species as a Function of Place and Time tested upon Lycaenidae of the Australasiatic Region"*, a pioneering study in which he formulated the principle of his species duplex, at the present time recognized and adopted by several zoologists. Unfortunately, this study was published in Dutch, which is the reason that it remained little known. His ambition of later years was to revise and republish it in English, but the war, his manifold interests, and his teaching prevented that.

Subsequently Toxopeus - "Tox" to his friends - went to Java in the same year, and was attached to several secondary schools, at Bandung, Batavia, and Buitenzorg. His spare time was entirely dedicated to zealous collecting and field observation during numberless trips in Java, Sumatra, and Celebes.

In 1938 he was appointed by the Government of the Dutch East Indies leader of the Dutch group of the Third Archbold Expedition to New Guinea 1938-39 (also called the joint Netherland-Indian-American Expedition), and collected insects in the Snow Mountain region for one year. These collections of insects were enormous, unrivalled, the richest we ever saw; the enthusiasm of every specialist concerned with their study is unanimous; many decennia will be needed for the study of this material. After the expedition, Toxopeus was attached to the Zoological Museum at Buitenzorg for two years, in order to assist with preliminary study of these collections. After the Japanese invasion he was taken prisoner of war, and after the capitulation of Japan sent for one year to Europe on a convalescence leave which he chiefly devoted to study and visits to entomological collections. Afterwards he was appointed Professor of Zoology at the University of Indonesia at Bandung, where he taught till his death. He was chairman of the Entomological Society in Indonesia, member of the Netherlands Entomological Society and since 1948 of the Lepidopterists' Society.

Toxopeus was an unforgettable figure. Very tall and thin, he looked frail but possessed in fact most enviable energy and stamina. Great and highly infectious was his enthusiasm. It was a pleasure to speak to him of any matter or problem; one was always certain to receive his fullest attention and sound advice. His entomological reading was enormous, and his general knowledge of entomology, geography, and history of collecting in South Asia, together with his brilliant memory, brought him the nickname of "walking cyclopoedia". So great was his enthusiasm in collecting and unhemmed his interest for every group of Macrolepidoptera that for years he hardly took time to get down to publication of his knowledge. But in the later years more and more papers came from his hand, and great were his plans for the future. His lamented death interrupted his almost completed study of the Papuan Delias which he intended to read before the International Entomological Congress in Amsterdam this summer. He was the most scrupulous and the best collector we ever met.

Always kind and good-humored, an excellent entertainer, he was greatly popular among his pupils, at high schools as well as at the University, amongst his colleagues and his very numerous friends. His so abrupt and tragic end leaves a gap which never can be filled. Our sincere sympathy goes to his wife and seven children.

A. Diakonoff

One of the best known British amateur lepidopterists, HENRY JEROME TURNER, died 19 December 1950. He was born 27 August 1856. He was a schoolmaster of the Denmark Hill School for many years and eventually became Headmaster. Turner was a devoted disciple of J.W. Tutt and succeeded him as editor of the Entomologists' Record in 1911 at Tutt's death. For many years he published little supplements to Tutt's "Varieties of the British Noctuae". His largest single work was Butterflies of Cyprus. In spite of a very large number of short papers he did little original research. He was most devoted to his editorial and organizational duties. Turner was elected Honorary Life President of the Royal Entomological Society of London in 1944 and Special Life Fellow in 1948; he had been Librarian for some years beginning in 1921. He was Editorial Secretary of the South London Entomological Society for about 40 years, beginning in 1894. N.D. Riley wrote of him: "A little man, bolt upright and of rather rigid views, Turner was every inch a schoolmaster and had been a figure in London entomological circles, and internationally, for more than sixty years when he passed away, still at work, on December 19, mourned by a very wide circle of friends."

---

* "De soort als functie van plaats en tijd, getoetst aan de Lycaenidae van het Australasiatisch gebied", 198 pp., 17 text figs., 4 plates, ed.H.J. Paris, Amsterdam, 1930.

A COORDINATED STUDY ON THE MIGRATION OF THE MONARCH BUTTERFLY: A PLEA FOR INFORMATION FROM LOCAL NATURALISTS

by Geoffrey Beall
University of Connecticut
Storrs, Connecticut

1. INTRODUCTION

When one goes to some new part of America, one may find that significant information on the migration of the Monarch Butterfly, Danaus plexippus L., is commonplace to the local naturalists. Such knowledge should be made generally available, coordinated, and put on record. In illustration of the harvest of information that should be gathered, let us consider a simple situation. First, let us note that Williams, et al (1942) has summarized all the migrations of the Monarch, as reported in the literature over a period approaching a century. Now, it is remarkable that no migrations have been reported in certain states, notably in the region midway between the Atlantic and the Mississippi. The gap is so glaring as to raise the possibility that there are two streams of migration, one down the coast to Florida, the other further inland, southwest to Texas or Mexico. What, however, are the facts, if one goes into the "empty" region, as into western Pennsylvania? The writer found that in this state there was a widespread, massive, and universal flight to the southwest in September, 1949. He learned, moreover, by enquiry from reputable and reliable local naturalists that many years such a flight is manifest in that region and in West Virginia during September. He was further told that considerable aggregations of the Monarch occurred by a lake near Pittsburgh and even on a hill-top in the city. Let us say that the situation in the "empty" region reflects more unfavorably on the inhabitants than on the Monarch Butterfly. Although, what could the local naturalists do with their isolated bits of knowledge in a field not of pre-eminent interest to them? Hence, we plead that they contribute such information to the Lepidopterists' Society for a grand assembly.

Readers of the Lepidopterists' News may well observe at this point that Danaus plexippus is already getting reasonable attention in the study on "The Nearctic Butterflies", in the "Field Season Summary", in certain special studies afoot to mark and recapture it, and in miscellaneous notes. To this we may first object that, as will appear below, we are interested in other aspects of the problem. Secondly, we make an especial claim for the Monarch to detailed study. It is THE MIGRATING BUTTERFLY, par excellence; it is easily seen, easily identified, and moves by day. If we knew better the details of its behavior perhaps we could more effectively study the movement of other less conspicuous insects.

The kind of record that might most usefully be contributed by local observers will be indicated below. The matter may, the writer hopes, be helped forward by a brief summary of some of his own endeavors with suggestions that further and wider observations of the same kind be made and reported.

2. WHAT IS THE TREND OF FLIGHT IN VARIOUS DISTRICTS?

The greatest contribution that could be made by local observers is the very simple one of reporting the trend of flight in various places over the continent. By this we mean, for instance, that they should have reported the fact that during the first two weeks of September, 1949, the flight in the region of Pittsburgh was steadily and strongly to the southwest. If 100 observers, in various parts of the continent, had made such a report during that September, we should have a map like that of the meteorologists and see where the currents of Monarch Butterflies were flowing. Perhaps such a map would only rival that of Williams if it were made up for September. If a similar map were, however, made up for June it would throw light on a period about which very little is known or can be known from the present approach to the problem - although as will be pointed out below a different approach could guarantee results. A similar map for the mid-summer might show northward movement in some parts of the country and southward movement in others so that we should be a little nearer the question of what decides the direction of movement.

It will be wise to warn any potential observer of what, in the way of flight, he should not expect to see. It will be further judicious to set forth in some detail how data on flight should be collected, compiled, and interpreted.

Let us note again that the flights that have been reported in the literature and summarized by Williams are great and massive flights such as merit note even in a local newspaper. Any observer may be so fortunate as to see such flights, but in these we are not unduly interested. We are interested particularly in the general trend of flight that is obvious to anyone who is in the field but which, let us say, merits no notice in the popular press. We are further interested in the total movement of the many single butterflies that can be seen from time to time, even in a season when they are scarce.

The remarks just made are necessary because the study of insect migration had an unfortunate start. In the first place it tends to be shaped against the background of the migration of birds. The questions asked usually presuppose a similar mechanism for birds and insects. People are anxious to prove, say, that the Monarch Butterfly does remove entirely to the south and then return. They want to know whether individuals do this, like birds, or whether successive generations do it. The migration of butterflies is not necessarily like that of birds, however, and there is presented briefly below some evidence that it is actually quite different. In particular, whereas birds interrupt their residence in either the north or the south to move briefly to the

other place, the Monarch seems to be always on the move, one way or the other. In the second place the casual nature of most records on insect migration has tended falsely to associate the movement with abundance of the insect because of its sensational character. The literature on the Monarch, and other insects, constantly reports the occurrence of great bands which are probably not truly bands but casual concurrences of great numbers of butterflies.

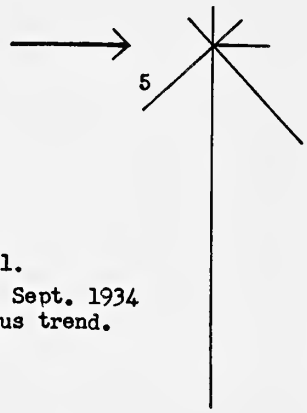


Fig.1.
Flight on 13 Sept. 1934
with obvious trend.

The reader may justly ask what the writer meant by saying there was a widespread and obvious trend to flight. The phenomenon can be illustrated with Fig. 1, which shows the number of Monarch Butterflies that passed during a single hour through a glade in Ontario, on 13 September 1934. The record is in the form of a rose and shows that there were 5 Monarchs going to the southwest, 19 south, 7 southeast, 3 east, 2 northeast, 2 north, and 2 northwest. There was clearly an overwhelming preponderance of movement to the south - yet butterflies being what they are, a few passed northward through the glade. Note that these butterflies were moving alone, one or at most two at a time, although the total effect was of unanimity to the south. Such records could be obtained very easily and regularly near Pittsburgh in September, 1949. Will local observers make such observations and fill up the empty states between the Atlantic coast and the Mississippi? There is no need to wait until great and spectacular flights are observed. Will others discover, during the autumn of 1951, how the Monarch flight tends in the eastern Gulf States? Do the Monarchs flow towards Texas or Florida? The question could be so easily answered. Is the trend of flight in the western part of the Carolinas towards Florida?

We have declared ouselves interested in the total movement of the many single butterflies that can be seen from time to time, even in a season when they are scarce (in contrast to the situation on 13 September 1934). This is a matter similar to that just discussed but requiring more patience and yielding even more valuable and unexpected information. The writer and some co-workers accumulated a number of such records on each Monarch and its direction of flight at Chatham, Ontario, which is near Detroit. The results for the period, July 1 through August 10, for the years 1935 through 1940, are summarized in Fig.2. For this period, it can be seen that there is a preponderance of movement to the north and west. It should be realized that only occasional single butterflies were involved; no one would have reported any movement at all, by casual observation. The possibilities of such an investigation will be better appreciated when, below, we come to the question of such trends of flight throughout the year.

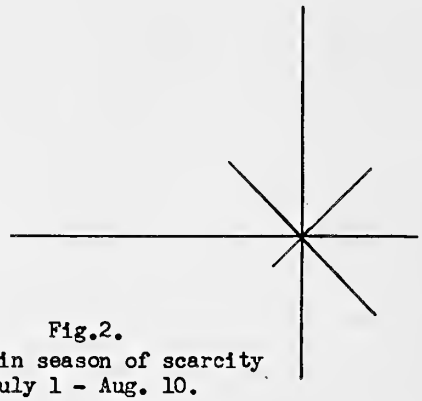


Fig.2.
Flight in season of scarcity
July 1 - Aug. 10.

Any very extensive collection of data, such as those of Fig.2, raises a problem as to how we may summarize more concisely the nature of flight. How are we to determine definitely and objectively the general trend of flight to the north and west? This problem may be solved by the numerical technique that we would use in physics to find the net effect of forces pulling in various directions. This elementary numerical technique may be familiar as the "polygon of forces". When the result, which is called a "vector sum", is divided by the total number of butterflies involved, we get both a measure of the direction and of unanimity of movement during the period in question. The whole matter has been discussed at some length by the writer (Beall, 1941). Let us not concern ourselves unduly with the technique except to note that it exists and provides a neat summary of results. Let us further note that if anyone collects the data, the analysis of the type indicated will most gladly be made for him. Send the data to Dr. Charles L. Remington or to the writer.

If the reader is prepared to think now of accumulations of data, like those of Fig.2, but wishes them resolved into net movements let him consider Fig.3. The direction of the net movement is indicated by the direction of an arrow. The unanimity of the movement is indicated by the length of the arrow. In such terms, Fig. 3 indicates the flight for various seasons in southwestern Ontario. The seasons were as follows:

(1) Earliest spring through June 30

(2) July 1 through August 10

(3) August 11 through August 24

(4) August 25 through September 7

(5) September 8 until the latest autumn.

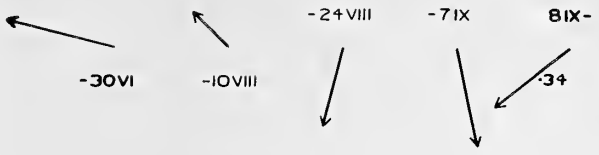


Fig.3. Net movement in various seasons.

Two effects are important. The first is that the unanimity of flight to the northwest in the spring is as great as that to the southwest in the autumn. It is strange to see that the flight is so unanimous before August. In this early period, before the butterfly has become abundant, it never attracts much attention and migration is hardly noted, and only in a casual way. Secondly, it seems that migration flows continuously and turns like the tide, at a certain critical period early in August. All spring and early summer it flows towards the north but in late summer it turns to the south and continues flowing that way all autumn. During the winter, it may even have its sluggish trend in California or Florida.

The local naturalists, to whom the present appeal is addressed, might in the spring of 1952 determine in a similar way the trend of flight in many parts of America. These results, when conjoined and plotted, would produce a map showing how the currents of Monarch migration flow in the spring. Such a picture would be very handsome without any appeal to the usual questions of whether the Monarch behaves like a bird in migration. It could, moreover, be undertaken with the advantage of guaranteed success, because it depends only on the event of seeing individual Monarchs - not on the chance of seeing some great and spectacular flight.

3. THE RECAPTURE OF MARKED MONARCHS

Current plans by certain members of the Lepidopterists' Society to mark very great numbers of butterflies, in the hope of their recapture, may fit together very well with evidence of the kind recommended above. The writer does not propose to deal at any length with this question but merely to say that he is most sympathetic, will cooperate, and urges local naturalists to examine all possible Monarchs for markings, which should be reported to Dr. Remington.

4. UNDER WHAT CIRCUMSTANCES DOES THE MONARCH FORM CLUSTERS?

The topic which the writer emphasizes, *i.e.*, that of trend of flight, is one that can be rather readily discovered by local observers and discovered only by them. There are, however, minor investigations on which we should perhaps touch. One of these is the question of the circumstances under which clusters of the Monarch form.

Let us note, in a general way, that the Monarch frequently attracts attention by its tendency to cluster on trees at night. This clustering, so frequently described in the literature, is again the grandiose phenomenon and worthy of the local newspaper. Nevertheless, the much less spectacular but biologically significant smaller clusters should also be reported. The writer has only once seen the great spectacular clusters but on the other hand he has seen clustering of the minor variety hundreds of times. One can see such clusters almost any day in early September on the capes or peninsulas along the northern shore of Lakes Erie and Ontario. There are undoubtedly other equally favorable situations in America. It should be noted, in passing, that it has commonly been supposed that these clusters regularly and only form in migration. In actual fact, they form only when a number of Monarchs happen to find themselves near one another in the evening, and they seem to form in the summer if such a coincidence of butterflies occurs.

It is becoming clear that coincidences of population sufficient to produce clusters occur most frequently when flight is barred by lakes. There is a suggestion, however, that they also tend to occur on hill-tops.

Observers, like those in the vicinity of Pittsburgh mentioned above, are in a position to report many clusters of the "minor" kind. Twenty or more Monarchs on a given tree are worthy of report. The naturalist should note briefly the circumstances: whether the clusters are beside a lake and if so on which shore; whether they are on a hilltop and if so their disposition with regard to wind; if they are elsewhere and if so whether the trees stand beside an open space and what the wind direction is.

5. HOW DO SEX PROPORTIONS VARY?

A second lesser point that may be conveniently studied by local observers is that of variation in sex proportions during migration. In illustration, we may consider a curious phenomenon that occurs in Ontario during the great autumnal migration. The situation may be illustrated by data (Beall, 1946), as follows:

1 September 1940 - 39% female
7 September 1940 - 47% female
14 September 1940 - 63% female

It can be seen that the proportion of females rose regularly, week by week, during this period. Such seems to happen every year, although why is not clear. It would be illuminating to see if this effect is accentuated in the flight down the continent, as if there were a tendency for males to outfly the females.

The data on percentage of females are based upon very highly representative collections from small clusters from which all the butterflies could be taken for examination. Since all the Monarchs were quiescent there was no question of one sex tending

to escape the net. Any study of sex proportions should be of such resting material rather than of butterflies taken on the wing.

6. SUMMARY OF RECOMMENDATIONS ON OBSERVATIONS

There is a vast amount of data to be collected before we have an adequate picture of the migration of even a single conspicuous species like the Monarch. We may summarize, in order of decreasing importance, the work that may be done by interested local observers as follows:

I. Record the direction of movement of each Monarch seen in fairly consistent flight, the direction of wind, and the date. For any period when a total of 30 Monarchs has been so recorded, it is possible to calculate the net flight and its degree of unanimity. If the reference to this numerical operation, given above, is insufficient for anyone to make the calculations, we will gladly make them if the data are sent to Dr. Remington or to the writer.

II. Record the circumstances of the Monarchs forming clusters - including small clusters down to 20 butterflies. There should be noted the day, hour, and circumstances. In connection with the circumstances, it is important to note whether the clusters were formed beside a lake or on a hill top. If they are formed in some other type of situation, the circumstances should be further described and in particular the direction and strength of wind should be noted.

III. Record the number of each sex if one is dealing (as in studies on recapturing marked specimens) with quiet Monarchs taken from clusters on trees.

The purpose in pointing out the great contributions that local naturalists may make is with the aim of correlating the vast amount of knowledge, which is insignificant in its parts but most important in the aggregate. Accordingly, all correspondence will be welcomed by Dr. Remington or by the writer. As previously mentioned any assistance in numerical analysis of flight data will be most gladly given. We shall guide ourselves by the contributor's desires as to the use made of such data. The contributors will, however, in all probability, usually hope for a report like those distributed by the Lepidopterists' Society on other special studies of groups and regions. It is hoped that such a report can be distributed to the contributors annually.

REFERENCES

Beall, G., 1941; "The monarch butterfly, Danaus archippus Fab. II. The movement in southern Ontario." Can. Field-Naturalist, vol.55: pp.133-137.

Beall, G., 1946; "Seasonal variation in sex proportion and wing length in the migrant butterfly, Danaus plexippus L." Trans. R. Ent. Soc. London, vol.97: pp.337-353.

Williams, C.B., et al, 1942; "Studies on the migration of Lepidoptera." Trans. R. Ent. Soc. London, vol.92: pp.101-283.

PERSONALIA

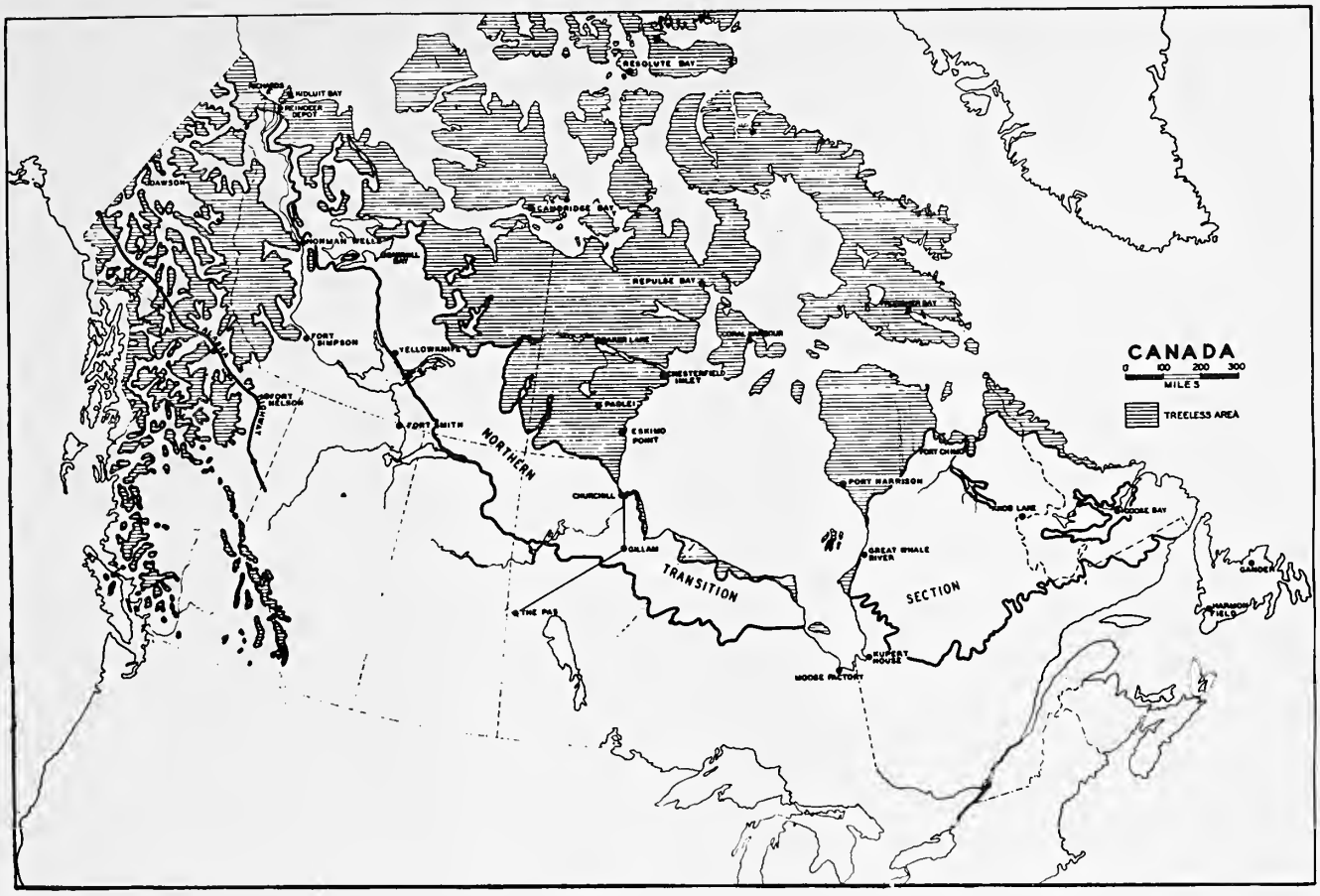
The vacancy in the Section of Insects and Spiders of the Carnegie Museum in Pittsburgh, created by the death of Dr. W.R. Sweadner, has been filled by the appointment of HARRY K. CLENCH as Assistant Curator, in charge of Lepidoptera. Mr. Clench, cofounder of the Lep. News, is a specialist in the Lycaenidae. It is satisfying to learn that the Museum is continuing to keep a lepidopterist on its staff, thus ensuring proper supervision of the tremendous collections assembled by W.H. Edwards, W.J. Holland, A. Avinoff, B.P. Clark, et al.

The issue of the Journal of the Washington Academy of Sciences for January 1951 has been dedicated to AUSTIN HOBART CLARK, on the occasion of his retirement as curator in the U.S. National Museum. In addition to a portrait and summary of scientific contributions, there are thirteen papers by friends and colleagues of Mr. Clark, describing new species and genera named for him of: fossil brachiopods and molluscs; and living molluscs, copepods, shrimps, corals, polychaetes, and Lepidoptera (a new Olethreutid described by J.F.G. Clarke). [Lepidopterists' Society members will recall that they have recently elected Mr. Clark First Vice President, and that he presided at the first annual meeting of the Society in New York, December 1950.]

M. PIERRE E.L. VIETTE, of the Paris Museum, has been awarded the "Prix Constant" by the Société Entomologique de France, for his distinguished work with the taxonomy of the Lepidoptera. M. Viette left Paris in late August, to spend six months in Madagascar, near Tananarive, to collect chiefly the Microlepidoptera. Very few "micros" are known from Madagascar. M. Viette attended the IXth International Congress of Entomology and the Special Meeting of the Lepidopterists' Society in Amsterdam in early August.

The death of M.N. RIMSKY-KORSAKOFF, noted Russian entomologist, was announced in Moscow 18 March 1951. His voluminous publications included work on Lepidoptera. He was President of the Entomological Society of Leningrad and bore the title from the Soviet Government "Honored Scientist of the Russian Republic". His father was the famous musical composer, Nikolai Rimsky-Korsakoff.

The Collection of the late HAROLD I. O'BYRNE, primarily composed of Missouri Lepidoptera, was recently purchased by the University of Missouri and thus becomes a major feature of the insect collection of the Department of Entomology there. Mrs. O'Byrne has settled in Sierra Madre, California.



Faunal regions of northern Canada and Northern Insect Survey localities.

NORTHERN CANADA AND SOME NORTHERN BUTTERFLIES

by T. N. Freeman
Ottawa, Ontario

The plan of this paper is to outline briefly the faunal zones of northern Canada and mention some of the butterflies characteristic of each. This information has been made available through the activities of the Northern Insect Survey, which has obtained, since it was inaugurated in 1947, approximately half a million arctic and subarctic insects, including about 125,000 Lepidoptera.

The accompanying map (Fig. 1) shows the locations of the survey parties, which were distributed from the Alaska boundary to Newfoundland, a distance of approximately 3,000 miles. The survey covered the Yukon, the vast Northwest Territories, and northern parts of British Columbia, Manitoba, Quebec, and Newfoundland, including Labrador. The localities are situated in the arctic tundra north of the tree-line, as shown on the map, and in the boreal forest south of it. These two zones are characterized by different species of Lepidoptera, which overlap somewhat at the tree-line. We shall call this intermediate zone the northern transition section. Ft. Chimo and Great Whale River, P.Q., Churchill, Man., Yellowknife and Reindeer Depot, N.W.T., are localities near the borders of this transition section. This distributional overlap is caused chiefly by the presence of islands of tundra within the northern fringe of the trees, and the extension of the forest into the tundra, particularly along drainage systems. The dispersal of a species is also responsible for some transitory distributional overlap. It is peculiarly significant that within this transitional area, where species of the barrens meet closely related species of the boreal forest, there is no evidence of gene interchange between the two. This suggests the hypothesis that phytophagous insects indigenous to the arctic tundra are specifically distinct from those indigenous to the boreal forest south of the transitional section. The following examples serve to illustrate this hypothesis. Erebia rossi Curt. is distributed over the barren lands from Reindeer Depot to Baffin Island. In the west, it occurs above timber-line in northern British Columbia. But, in

comparison, Erebia discoidalis Kby. occurs in southern Quebec from north of lakes Huron and Superior to James Bay, from south of Lake Winnipeg to Churchill, Manitoba, northwest to Great Slave and Great Bear lakes and west to Dawson, Yukon. These two species overlap at Churchill and Gillam, Manitoba. The exquisite bouncing-brown, Erebia fasciata Butl., occurs in the barrens of the Northwest, roughly north of a line from Dawson, Yukon, to Padlei in the Keewatin District of the Northwest Territories. At Dawson, Reindeer Depot, Coppermine River, and Great Slave Lake, fasciata meets Erebia disa Thun., which extends south to Banff, Alberta; Riding Mts., Manitoba; and Smoky Falls, Ontario, south of James Bay. Other examples of this type of distribution are the barren-land species Colias hecla Lef. and Colias nastes Bdv. which are separated from the boreal forest insect Colias interior Scud. by an inhabitant of the Transition Section, Colias pelidne Bdv. and Lec. Oeneis assimilis Butl. is another barren-land species, which meets Oeneis jutta Hbn. at the timber-line, the latter sphagnum-bog species extending well south into the boreal forest. Other examples are found in the genus Brenthis (or Boloria, if you prefer).

The boreal forest extends almost to the arctic coast near the mouth of the Mackenzie River, and such butterflies as the mourning cloak, Nymphalis antiopa L., and Papilio glaucus canadensis R. and J. have been collected at Dawson, Aklavik, Norman Wells, Ft. Simpson, and Ft. Smith, localities in the Yukon and in the Northwest Territories. These butterflies are typical of northern United States and southern Canada. I mention this to point out that, if any collector is contemplating a trip to collect arctic species, he may be within a few miles of the Arctic Ocean and still capture butterflies he could obtain near the Mason-Dixon Line. Some of the true arctic-tundra species extend south at arctic-alpine elevations in the Cordilleran mountain system to Colorado. In the east, some extend southward as isolated populations to arctic-alpine regions in New Hampshire.

The arctic tundra, although inhospitable at times, supports countless thousands of specimens of a few butterfly species, and at times it is possible to collect over 200 specimens of a single species in a day. It is rare, indeed, to match this condition in the south.

- -

This is Contribution No.2780, Div. of Entomology, Science Service, Dept. of Agriculture, Ottawa, Canada. The Northern Insect Survey is a joint project of the Defense Research Board, Dept. of National Defence, and of the Division of Entomology of the Department of Agriculture, Canada.

SOCIETY NEWS

The Secretary, Dr. F.H. Rindge, has sent notification of action taken by the Executive Committee, as provided by the Constitution, as follows:

1. THE ANNUAL MEETING FOR 1951 WILL BE HELD IN CHICAGO, ILLINOIS, at the Chicago Natural History Museum (formerly Field Museum), on December 28-29.

2. Article 3, Section 1, of the By-laws has been amended to read as follows:

"An order of business for the annual business meeting shall be prepared by the Secretary in consultation with the President. The remainder of the program for the annual meeting shall be prepared by the Chairman of the Program Committee."

3. Charles L. Remington has been appointed Editor-in-Chief and Librarian.

The Special Meeting of the Lepidopterists' Society, announced in the preceding issue of the News, was held in Amsterdam on 21 August under the chairmanship of Dr. Walter Forster, of München, Germany, Vice President of the Society. The program was devoted to a symposium with the title "The Phylogeny and Classification of the Lepidoptera." The three invited speakers were: Prof. T.A. Wohlfahrt of Würzburg, Germany; M. S.G. Kiriakoff, of Ghent, Belgium; and Prof. H.E. Hinton, of Bristol, Great Britain. Their papers will be published in an early issue of the News, along with the report on the Meeting by Dr. A. Diakonoff, who served as Chairman of the Organizing Committee. Dr. Diakonoff writes that 750 copies of our tri-lingual program were distributed to the members of the IXth International Congress of Entomology, in conjunction with which we held our Meeting. He also notes that our Meeting was well attended and that "everybody agreed that it was a success."

We received with great pleasure a greeting addressed to the Editor-in-Chief and signed by 37 of the members and guests who attended. The signers represented at least 12 nations on 4 continents.

Society members in Europe will be pleased to know that arrangements have been made with E.J. Brill, our Amsterdam agent since 1949, so that Society dues and News subscriptions may be paid in the following countries in native currency, addressed to Brill as follows - (from all other countries, except Italy, remittance can be made direct by postal orders):

NETHERLANDS: Amsterdamsche Bank, Leiden.
FRANCE: Crédit Lyonnais, Compte no. P.B.C. 11.055, 19 Blvd. des Italiens, Paris.
GREAT BRITAIN: Barclays Bank Ltd., Chief Foreign Branch, 168 Fenchurch St., London E.C. 3.
GERMANY: Postcheckkonto Karlsruhe 44378, in the name of E.J. Brill Verlag, Heidelberg.

Remittances, when in dollars, should always be sent directly to the Society Treasurer.

C.L. Remington

SIMPLE STATISTICS FOR THE TAXONOMIST

(continued from page 6)

by F. Martin Brown
Colorado Springs, Colo.

II. INDICES

How often have you seen a statement like this: "The bands on 'A' are wider than those found on 'B'"? In all probability each time that you have seen such a statement you have wondered what the author really meant. You have wondered if you would agree with him that the differences are worth mentioning. You would like to know how much wider they are or better still how wide they are on each member of the pair.

The best way to state such a measurement is as an index. Let me show by a concrete example just how this works. In the course of a study of the variation found in Heliconius charitonius, William P. Comstock made a great many measurements on a large series of specimens. During this study he came to the conclusion that the Mexican series before him represented a population that was different from the nominotypical population from the Virgin Islands. One of the characteristics of the Mexican population as defined by Mr. Comstock is the narrowness of the yellow bands across the forewings.

THE PROBLEM: Are the yellow bands across the forewing of the Mexican population of H. charitonius significantly narrower than those found on H. charitonius charitonius (Linné) from the type area?

THE SOLUTION: Among the measurements made by Mr. Comstock are two that have a bearing on our problem: the radius of the left forewing and the width of the yellow bands on the forewing taken at a standard point referred to the venation of the wing. Table 4, below, was developed from the individual measurements of these characters by treating them as outlined in the first of these articles.

TABLE 4.

Certain Parameters of Two Samples of Heliconius charitonius

	Width of Discal Band		Radius of Forewing	
Sample	Mexico	Virgin Is.	Mexico	Virgin Is.
N =	84	43	84	43
Mean (mm.)	2.35	2.36	41.81	38.02
$p.e._m$ (mm.)	0.02	0.03	0.25	0.26
S.D. (mm.)	0.26	0.25	3.43	2.53

When we examine the data labelled "Width of Discal Band" it is immediately evident that bands on the two series have essentially the same width. Testing the data we find: difference 0.01 mm.; probable error of the difference 0.04 mm.; "t" score 0.25. With "t" less than 1 we can safely say that there is no difference in the absolute width of the bands on these two series.

Turning to "Radius of forewing" there seems to be a real difference. Testing the data we find: difference 3.79 mm.; probable error of the difference 0.36; "t" score is greater than 10. With "t" so large there is little chance that the difference in size between these series is fortuitous. We can safely say that the Mexican population is really larger than the Virgin Is. population [H. charitonius charitonius].

Since the bands are the same width on the two samples they will seem narrower on the larger insects and wider on the smaller insects. This apparent difference in band width can be stated numerically. It is done by establishing the BAND INDEX for each specimen. The band index is nothing more than the width of the band stated as a percent of the radius of the forewing:

$$\frac{\text{width of band}}{\text{radius of forewing}} \times 100 = \text{band index}$$

The band index takes into consideration the size of the specimen in such a way that if the radius of the forewing is constant the index fluctuates directly with the width of the band, the wider the band the larger the index number. The band index therefore is a concise statement of the relative width of the band. This technique can be used for finding a numerical expression for many types of relative condition. Indices of this sort may be treated as linear measurements and their parameters defined. Table 5 does this for our two samples.

TABLE 5.

The Band Indices of Two Samples of Heliconius charitonius

Sample	N	mean	$p.e._m$	S.D.
Mexico	84	5.63	0.04	0.55
Virgin Is.	43	6.37	0.05	0.44

By applying the standard tests to these figures we find: difference 0.64; probable error of the difference 0.06; "t" score is over 10. Again "t" is so

large that there is virtual certainty that the apparent difference in relative width of the bands is real.

REMEMBER THIS: When using indices be certain that the basic measurement used is a fundamental property of the specimens being studied.

[Mr. David Calhoun, biometrician at Yale University, has very kindly reviewed this series of articles and made pertinent suggestions, some of which I have incorporated in the text. In this instance I think it best to quote him. "Indices: when it is stated that indices may be treated as linear measurements, I think this depends on the nature of the significant variation of the measurement in the numerator of the index. — Is the absolute amount of variation of width in mm. what is important, or is it the percentage variation that is important? If the latter I think an alternative linear measure is fairly convenient and more nearly normal — the difference between the logarithms of the width and radius, log (width) - log (radius): this is essentially the logarithm of the index." In the example used I feel that it is the absolute width of the band that is most important, thus the simple index yields satisfactory results. When in doubt it might be better to use the method suggested by Mr. Calhoun.]

III. FREQUENCIES

Frequency is quite another kind of measurement from those just discussed -- linear measurements and indices. The basic formulae used to analyze frequencies are different. Generally frequencies are reduced to a statement of percent such as "37.5% of the specimens examined show spot 'A'". This really is a very tricky statement, in spite of all of its forthright simplicity. Actually it means very little unless it is accompanied by a statement of the number of specimens involved. A little thought shows that the smallest number of specimens that might be involved is 8 and that in this case 3 of them show spot A. Now it is interesting to know that three specimens before the author bore spot A. But is that really what we want to know? Don't we want to know the frequencies for A that might occur in other samples from the same population? I think it is. There is a simple arithmetic way of determining this.

Because a percent, or frequency, is a single experience based upon a number of specimens, we need know the standard deviation of the observed frequency. The Point Binomial Theorem is used to tell us this S.D. The formula involved is this:

$$\sigma = \sqrt{npq}$$

In this formula "n" is the number of specimens involved, "p" the decimal frequency with which the spot occurs,* and "q" the decimal frequency with which the spot is absent (q = 1.00 - p). All you need to do is multiply these three numbers and then take the square root of the final product. That is the S.D. GIVEN IN INDIVIDUALS. To make it applicable to the frequency just convert the number to percent of "n". Now let us go through these steps with our sample of 8 specimens of which three bear spot A.

$$\sigma = \sqrt{8 \times 0.375 \times 0.625}$$
$$= \sqrt{8 \times 0.234375}$$
$$= \sqrt{1.865000}$$
$$\sigma = 1.368$$
$$\text{S.D.} = \frac{1.368}{8}$$
$$= 0.171 \text{ or } 17.1\%$$

Now the bald statement 37.5% becomes 37.5±17.1%. That is quite different, for it means that actually about two-thirds of the time the frequency lies somewhere between 20% and 55%!

To show how great the effect of small sample size is upon the S.D. of a frequency I have calculated this statistic for 37.5 percent frequency using several sizes of samples.

TABLE 6.

The Standard Deviation and certain limits for 37.5% Frequency

N	S.D.	95% limits	99% limits
8	17.1%	4.2-70.8%	0-81.6%
16	12.1%	13.8-61.2%	6.4-68.6%
64	6.1%	25.6-49.4%	21.4-53.2%
200	3.4%	30.8-44.2%	28.7-46.3%
1000	1.5%	34.5-40.5%	33.5-41.5%

First let me show how to read this table: taking the case of the original sample of 8 specimens it says that 95% or 19 out of 20 samples of 8 specimens each drawn from the same general population as the first sample will have frequencies for spot A anywhere between 4.2% and 70.8% (for practical purposes 0 and 75%); and that 99 out of 100 samples of 8 specimens each drawn from the same general population as the first sample will show frequencies between 0 and 81.6% for spot A (for practical purposes 0 and 75%).

The parenthetical statements "for practical purposes" may bother some. When 8 specimens are involved the frequencies can be only these - 0, 12½, 25,

* When "p" is very large or very small the S.D. determined by the method outlined does not behave as it is expected to. This is because the curve formed by plotting many "p"s determined from the same population is not a Normal Curve but a skewed curve with quite different mathematical properties. A skewed curve is crowded to one end, thus S.D. is warped and the 2.5% and 0.5% cut-offs for the 95% and 99% limits are not the same distance each side of "p". Under such conditions Fisher and Yates' Tables (no. VIII) should be consulted.

Brown: SIMPLE STATISTICS FOR THE TAXONOMIST - cont.

37½, 50 62½, 75, 87½, 100 percents. So for practical purposes we take the nearest possible percent to the mathematically determined limits.

This explains my point that "37.5%" standing alone means very little. The point that I want to make is this: A percent frequency standing alone tells you something about the sample being studied but it does not tell you anything about other similar samples from the same population. It lacks prediction value and therefore is of little scientific significance.

It is essential to remember this: When making a statement of percent always state the number of specimens involved or, better still, accompany the percent with its standard deviation.

There are other questions about frequencies that come up such as when two samples are involved that may represent two different populations. Turning again to Mr. Comstock's data on H. charitonius I find that of 100 females from Florida the yellow bands on 44 are washed with rusty scales. Just across the narrow straits lies Cuba. The sample of 46 females from there contains 4 individuals with rusty scales on the yellow bands. The question is this: Do the Florida females differ significantly from the Cuban females in respect to the presence or absence of rusty scales on the yellow bands? Here is how the problem is treated to arrive at a "t" score. The frequencies are calculated as percent of specimens bearing the rusty scales - 44.0% for the Florida sample and 8.7% for the Cuban. The S.D.s are computed using the point-binomial formula given above -- 5.0% for the Florida sample and 4.2% for the Cuban. The difference in the percent frequencies is found (44.0 - 8.7) to be 35.3%. The S.D. of this difference is found by the same method as used for determining the probable error of a difference (see first article) -- the square root of the sum of the squares of the two standard deviations.

When the above arithmetic has been completed we have the difference in frequencies being 35.3 ± 6.5%. The difference is about 5.4 times the size of its standard deviation. Tables of probability tell us that the odds of observing such a difference in the same population are about 1 in 2 million! I think that I am willing to accept this chance and say that the two populations are really different in this character. CAUTION: When using probability tables for differences in frequency, we are dealing with standard deviations, not probable errors, so we must enter the proper table! Any "t" score above 4.7 for frequencies is as significant as one of 7 for linear measurements when the systems for calculating the "t" score outlined in this series of articles is used.

[To be continued]

The entire September issue of the Journal of the New York Entomological Society is devoted to publication of the "Entomological Reminiscences of William Henry Edwards", with an introduction and annotations by Cyril F. dos Passos. The editor of the Journal has transmitted a note explaining that "the Reminiscences are devoted mostly to Edwards' experiences with Lepidoptera and the publication of the Butterflies of North America, and cover the period from about 1843 to 1902. A number of the collectors and lepidopterists of his day are mentioned and some details concerning them are given." Mr. dos Passos has added many new biographical notes resulting from his research. [See his account in the Lep. News, vol.3: pp.61-62; 1949.] Having had a glimpse of the "Reminiscences", which arrived just as this issue was going to the printer, I can recommend them highly as fascinating and historically important. Non-subscribers to the Journal may purchase them for $1.50 from:

Mr. Arthur Roensch, Treasurer
N.Y. Entomological Society
American Museum of Natural History
New York 24, N.Y.

Mr. dos Passos has also assembled Edwards' autobiography but has not yet succeeded in finding a publisher.

C.L. Remington

Supplies of additional reprints have recently been sent the News editor for gratis distribution to Society members. They are as follows:

Evans, W.H., "Life History Notes on Incita aurantiaca Hy.Edw." (1950)
Field, W.D., "Notes on Erora laeta (Edwards) and Erora quaderna (Hewitson)." (1941)
Field, W.D., "The Correct Name for the North American Butterfly Variously Called Nymphidia, Calephelis, or Lephelisca." (1948)
Field, W.D., "The International Commission on Zoological Nomenclature and the Correct Name for the North American Monarch Butterfly." (1950)
Field, Clarke, and Franclemont, "On a Recent Proposal to Correct an Error Committed by the International Commission on Zoological Nomenclature at the Paris 1948 Meeting." (1951)
Leech, H.B., "Flights of Nymphalis californica Bdv. in British Columbia and Alberta in 1945." (1946)
Leech, H.B., "The Occurrence of a Hollyhock-Seed Eater, Noctuelia rufofascialis, at Vernon,B.C." (1949)
McElvare, R.R., "A New Grotella from S.W. Texas."(1950)
McElvare, R.R., "Notes on Heliothiinae - More Recent Records of Rare Species." (1950)
Rawson, G.W. and S.A. Hessel, "The Life History of Strymon cecrops Fab. in New Jersey." (1951)

Reprints are postpaid to members outside the U.S.A. Members in the U.S.A. please send postage.

Since its inception, the "Recent Literature on Lepidoptera" section of the Lep. News has included adverse comments on papers being abstracted which have been exceptionally remiss in presenting the essentials which taxonomists almost uniformly agree are necessary when new entities are being named. On just two occasions the "injured" authors have replied to us, attempting in most unconvincing phrases to defend their papers. One of the two, a worker whom we regard as the worst offender in present-day papers on Lepidoptera, wrote very recently, and it occurs to me that it would be well now to set forth my views on several points relating to good descriptions. These views are of course not exclusively or originally my own but for the most part are shared by nearly all modern animal taxonomists.

1. In the description of every new subspecies, species, genus, or other taxonomic entity there must be a clear statement of the CHARACTERS BY WHICH THE NEW ENTITY DIFFERS FROM ITS NEAREST RELATIVE. The practice of giving a lengthy description of part after part (or worse, a skimpy one), with no mention of differences, makes it appear that the author has not made the expected comparisons and therefore is premature or grossly negligent in naming a new entity. The International Rules of Zoological Nomenclature have tried to regulate this point, [Règles, Art.25] but with only mild success.

2. In research with Lepidoptera today, no proposal of a new species can be regarded as complete without a DESCRIPTION OR FIGURE OF THE MALE GENITALIA. It is true that a few cases are on record in which two apparently distinct species are said to show no genitalic differences (scores of such cases have fallen by the wayside when more careful studies were made later, either of the genitalia or of the specific status of the two entities), but genitalic characters of importance are so nearly always present that an adequate describer is obliged to search for them and report on his search. The internal female genitalia have also been used with great success in a few studies, but so little is in print as a basis for comparison, and techniques of preparation are so difficult, that a description of the female genitalia cannot yet be regarded as necessary.

3. Unless financial considerations make figures impossible, EVERY PROPOSAL OF NEW SPECIES SHOULD BE ILLUSTRATED. For Lepidoptera, photographs of wing patterns are usually valuable, especially for subspecies. But perhaps most important are line drawings or excellent photographs of critical structures, such as the genitalia, the venation, the antennae, the palpi, the tarsal claws, and so on.

4. Every author naming a new species or subspecies (race) must give a CLEAR DESIGNATION OF TYPES. At least THE TYPE (holotype) must be designated, and a special label (preferably on red paper) so stating should be attached to the specimen. Many taxonomists also designate one allotype (the sex opposite that of the holotype) and one or more paratypes. Paratypes should, however, be from the same population as THE TYPE; specimens from "more than 50 miles away" or from very different environments should be listed but not designated as paratypes. Cotypes are now archaic and cumbersome, since a later author or paper must select one lectotype (lectoholotype) from the cotypes. No type should be designated in print unless each specimen listed receives a type label, and of course no specimen can be positively called a type unless it has been so mentioned in the original paper. "Neotypes" have no standing under the Rules to date, and many existing "neotypes" were so loosely chosen that they should be withdrawn. A designator of a neotype should be reasonably sure that the specimen before him represents the same population as had the original type which is now destroyed or lost. [See Lep. News, vol.2: p.26 and vol.3: p.14, for type nomenclature and definitions.]

5. THE FULL DATA OF THE HOLOTYPE MUST BE GIVEN, since the "type locality" is thereby designated. With the growing emphasis on geographic subspeciation and on the population concept, it is probably as important to know the precise "type locality" (the locality in which the population represented by the holotype may be sampled by other workers), as it is to know the characteristics of the type specimen. In well-settled regions with permanent political subdivisions, the nearest town and its county (or equivalent) and province or state should be given. In thinly settled regions a village should be mentioned if possible, but the precise latitude and longitude should also be stated. Specimens collected in mountainous regions should be accompanied by an estimate of the altitude. Obviously, many old specimens and a few recently collected ones have only scanty data, such as "California", "Brasil", etc. In such rare cases, of course the describer is forced to omit a more precise locality. But the author should never publish less than the full data accompanying the specimen designated as holotype.

6. THE DISPOSITION OF THE TYPE MUST BE GIVEN. Furthermore, taxonomists frown more and more on the practice of a private individual retaining the holotype in his own collection. I have noticed that the most enlightened private taxonomists usually present at least the holotype to a museum or other institution with facilities for protecting types and preferably with a permanent staff member responsible for care of the insect collection. Nevertheless, if the holotype is (regrettably) kept in a private collection, that should be so stated. In these days of possible destructive war, it is wise to send a pair of good paratypes to each of several institutions well separated from each other geographically.

7. Every genus named as new should be clearly tied by unequivocal designation to a TYPE SPECIES (generotype, not "genotype"). It is of course desirable to list in addition all the other species which are to be placed in the new genus.

8. A new name (nomen novum) proposed to replace a junior homonym should be clearly marked "nom.nov." or "n.n.", etc. and should never be marked "sp.n." or "gen.nov.", etc.

If there are lepidopterists who wish to take issue with any of these points or to augment them, space will be found in the Lep. News in which their views may be presented.

C.L. Remington

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped that eventually our coverage of the world literature will be virtually complete. It is intended that every paper published since 31 December 1946 will be included. In the first four volumes of the Lep. News 1437 were listed. Abstracts give all new subspecies and higher categories with generotypes and type localities. Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members and the many regularly received are gratefully acknowledged. Initials of cooperating abstractors are as follows: [P.B.] - P.F. Bellinger; [A.D.] - A. Diakonoff; [L.G.] - L.A. Gozmány; [G.dL.] - G. de Lattin; [C.R.] - C.L. Remington; [T.S.] - T. Shirôzu. A complete set of these pages, for clipping and filing, may be obtained for Vol.4 for $0.50, and a subscription for Vol.5 for $0.50.

---

40. Avinoff, A., and Walter R. Sweadner, "The Karanasa butterflies; a study in evolution." Ann. Carnegie Mus., vol.32: pp.1-250, 18 pls., 20 figs. 10 Feb. 1951. Revision of this central Asian genus (or subgenus) of Satyridae. Describes as new: K. voigti nigrocellata (Puistagoli, Koh-I-Baba, Afghanistan); K. bolorica hodja (Chodja Mahomet, Afghanistan); K. decolorata grumi (Visharvi Pass, Darwas, Bokhara); K. d. mushketovi (Muzkulak, central Pamir); K. d. roborovskyi (Koshalayak Glacier, W. Pamir); K. d. maureri (Bukhara); K. d. iskander (Hasret Sultan, Bukhara); K. d. maidana (Archi-Maidan, Zaravshan Mts., Russian Turkestan); K. josephi hissariensis (Hissar, Bukhara); K. j. darwasica (Visharvi Pass, Darwas, Bukhara); K. j. oshanini (Katelmysh Glacier, Pamir); K. j. angrena (Tschotkal Mts., near Angren, Russian Turkestan); K. j. arasana (Arasas-Bulak, Russian Turkestan); K. j. praestans (Aulie Ata, Syr Daria, Russian Turkestan); K. j. kasak (Targaisk, Kandyktau, Kazakstan); K. wilkinsi robusta (Taldyk Pass, Alai Mts.); K. w. durana (Dura Pass, S. of L. Issyk-kul); K. kirgizorum (Alexander Mts., Russian Turkestan); K. leechi erubescens (Gursy Tash, Pamir); K. l. jacobsoni (Kaindy, Pamir); K. l. alitchura (Alitchur, Pamir); K. l. centralis (Pamir Post); K. l. gregorii (Beik Pass, Chinese Turkestan); K. l. mihmana (Mihman-yuli, Pamir); K. l. hunza (Misgah Hunza, Hindu Kush); K. latifasciata obscurior (Turgen Pass, Russian Turkestan); K. l. occidentalis (Naryn, Russian Turkestan); K. regeli ruckbeili (Burkhan, N. of Djarkent, USSR); K. r. aksuensis (Aksu, Chinese Turkestan); K. r. eburnea (Utchianunak, Kashgar); K. abramovi naryna (Naryn, Russian Turkestan); K. a. lactaea (Yagatch-art, Russian Turkestan); K. pamira ornata (Gursy Tash, Pamir); K. p. holbecki (Gushkon Pass, Darwas, Bukhara); K. p. kafir (Nuksan Pass, Hindu Kush, Kafirstan); K. p. haslundi (Marak, Koh-I-Baba, Afghanistan); K. moorei haarlovi (Kotal Pass, Koh-I-Baba, Afghanistan); K. m. dubia (Baroghil Pass, Chitral); K. modesta gemina (Bara Lacha Pass, Lahoul); K. m. baltorensis (Baltoro Mt., Shigar, Baltistan); K. astorica expressa (Bura Deosai, Ladak); K. rohtanga (Rohtang Pass, India). Gives original description (in English) of all forms of the genus. Figures adults of all forms (usually several specimens; colored figures of most) and ♂ genitalia of most. Pattern and structure of the genus are thoroughly described. The authors prefer to avoid specifying the rank of the various forms, though a formal classification is given for convenience. The genus is extremely intricate, with intergrading 'species' and sympatric 'subspecies'. The grouping of the forms is based on the ♂ genitalia, pattern, and presence and form of androconia. Evolution, dispersal and relationships are discussed and illustrated diagrammatically. [P.B.]

41. Box, Harold E., "Report upon specimens of Diatraea Guilding (Lepidoptera, Pyralidae) in the Cornell University collection." Journ. N. Y. Ent. Soc., vol.58: pp.241-245. 'Dec. 1950' [19 Feb. 1951]. Records of 14 spp. from North and South America. [P.B.]

42. Bretherton, R. F., "Butterflies near Stockholm." Ent. Rec., vol.62: pp.79-80. Sept. 1950.

43. Brower, Auburn E., "Methods for collecting underwing moths (Catocala)." Lep. News, vol.1: pp.19-20. June 1947.

44. Brown, F. Martin, "Colorado Plebeius saepiolus." Ann. Ent. Soc. Amer., vol.44: pp.286-292. July 1951. Describes as new P. s. whitmeri (Rampart Range Road, Teller Co., Colo.). Analyzes size and color differences in 6 ssp. of saepiolus, and presents a theory of the origin and dispersal of the species. [P.B.]

45. Corbet, A. Steven, "Proposed use of the plenary powers to suppress the trivial name ajax Linnaeus, 1758 (as published in the binominal combination Papilio ajax) commonly but incorrectly applied to the species named Papilio marcellus by Cramer in 1777 (Class Insecta, Order Lepidoptera)." Bull. Zool. Nomenclature, vol.2: pp.26-29. 20 Apr. 1951. The application of this name to the American P. marcellus or P. polyxenes is invalid. It properly refers to the Oriental P. xuthus, over which name it has priority; but in view of the past confusion regarding the identity of ajax it is recommended that the name be suppressed entirely. [P.B.]

46. Doets, C., "Biology and Variation of Eidophasia messingiella F.R. (Lep., Plutellidae)". Ent. Berichten, vol.12: pp.85-86, 6 figs. 1 June 1950. Attaches new names to four aberrations of wing markings. (In our opinion this procedure is objectionable). [A.D.]

47. Ehrlich, Paul R., and Nicholas W. Gillham, "A New Atrytone from Nebraska (Lepidoptera: Hesperioidea)." Ent. News , vol.62:pp.188-189. June 1951. Describes as new A. conspicua buchholzi (Valley, Neb.). [P.B.]

48. Evans, W. H., "A Catalogue of the Hesperiidae from Europe, Asia and Australia in the British Museum (Natural History)." 502 pp., 52 pls., 6 figs. London: British Museum (Natural History). 1949. A running key to subfamilies, genera, species and subspecies, including all 1641 forms found in this area. The key structural characters are described and illustrated in and introductory glossary. Describes as new: BORBO (type Hesperia borbonica); Bibasis oedipodea paltra (Mindanao); B. miracula (Kuantun, Fukien, China); Allora doleschallii solon (Aola, Guadalcanar); A. major lectra (Biak); A. m. talesia (Talesia, New Britain); Hasora proxissima takwa (Utakwa R., Dutch New Guinea); H. anura china (Ta Tsien Lou, China); H. danda (Kalaw, S. Shan States); H. discolor eira (New Ireland); H. borneensis luza (Leponto, N. Luzon); H. taminatus andamana (S. Andamans); H. hurama mola (Batchian, Malay Archipelago); H. schoenherri gaspa (Naga Hills); H. vitta manda (S. Andamans); H. khoda plexa (Buru); H. leucospila spila (Amboina); Chaetocneme callixenus stringa (Hydrographer Mts., Br. New Guinea); Capila phanaeus fiducia (Khasi Hills, Assam); C. p. falta (Kanbauk, Tavoy); Lobocla liliana zesta (Momeit, N. Burma); L. l. tonka (Ngai Tio, Tonkin); Celaenorrhinus oscula (Tien Tsuen, China); C. ratna daphne (Kumaon, India); C. morena (Naga Hills); C. putra questa (Liwa, Sumatra); C. munda joka (Tsekou, Yunnan); C. dhanada hanna (Kanbauk, Tavoy); C. d. hersa (Sumatra); Darpa

48. Evans (cont.)
striata minta (Sebong, Manipur); Coladenia dan festa (Kirbari, Naga Hills); C. d. fatua (Gangtok, Sikkim); C. d. fabia (Margherita, Assam); C. laxmi landa (Sebong, Manipur); Sarangesa purendra pandra (Karwar, N. Kanara); S. dasahara adona (Pachmarhi); S. d. sandra (Middle Andaman Is.); Seseria dohertyi scona (Lou Tse Kiang, Yunnan); S. d. salex (Hainan); S. sesame (Sarawak); Pintara pinwilli banga (Tameang Lajang, Borneo); Daimio tethys roona (Se-Pin-Lou-Chan,Ya-Tcheou, China); D. phisara rex (Tse Kou, Tibet); Tagiades parra gala (Sikkim); T. p. naxos (Perak); T. waterstradti talanga (Gunong Talang, Pad Bovenland, Sumatra); T. menaka tanda (Lebong Tandai, Mt. Lalangia, Sumatra); T. trebellius lola (Treasury Is.); T. nestus juncta (Obi, Moluccas); T. n. brunta (Woodlark Is.); Abraximorpha davidii esta (Ngai Tio, Tonkin); A. d. elfina (Java); Odontoptilum angulata sinka (Los Baños, Luzon); Caprona agama gubina (Sumba, Sunda Is.); C. a. alora (Alor Is., Dutch New Guinea); C. alida vespa (Nilgiris); C. a. yerburyi (Kootur, Chittar Pahar, Punjab); Erynnis montanus monta (Tse Kou, Yunnan); E. marloyi max (Khojak, Baluchistan); E. m. pathan (Chitral, Utzun Valley, India); Carcharodus alceae gooraisa (Goorais, Kahmir); Spialia osthelderi gecko (Hyrcania, Persia); S. doris daphne (Ziz Valley, Atlas Mts.); Muschampia tessellum tersa (Ordub, Persia); M. proto lambesa (Lambèse, Algeria); M. poggei patta (Kuliab, Afghanistan); M. staudingeri musta (Paghman Mts., Afghanistan); M. g. loga (Logar Valley, Afghanistan); M. g. phil (Chotair, Baluchistan); Felicena dirpha nota (Goodenough Is.); F. dora (Majoebui, New Guinea); Toxidia inornatus anga (Angabunga R., Br. New Guinea); Carterocephalus hovangty bootia (Gyatsa, Bhutan); Baracus vittatus gotha (Animalai Hills); Ampittia dioscorides singa (Ceylon); Aeromachus stigmata shanda (Kalaw, S. Shan States); A. jhora creta (Khasi Hills); A. j. skola (Battak Mts., Sumatra); A. dubius impha (Imphal, Manipur); Sovia malta (Kabru, Manipur); Pedesta blanchardii shensia (Tapai Shan, S. Shensi, China); P. baileyi nanka (Wushi, Szechwan); Thoressa fusca strona (Kuantun, Fukien); Halpe homolea molta (Sikkim); H. h. filda (Mangpo, Sikkim); H. h. handa (Thandaung, Karen Hills, Burma); H. dante dante (Negros); H. d. luzona (Palali, Benguet, Luzon); H. d. tilia (Mindanao); Eogenes alcides uraka (Urak, Baluchistan); E. a. chitrala (Chitral); Koruthaialos rubecula cachara (Cachar Rd., Manipur); K. r. rubina (Kina Balu, Borneo); K. r. verona (Java); K. r. balina (Bali); K. r. ponta (Palawan); K. r. atra (Mindanao); K. sindu monda (Naga Hills); K. s. tanda (Nias); K. fecula frena (Kina Balu, Borneo); Stimula swinhoei disca (Karen Hills, Burma); Ancistroides gemmifer dorna (Sipora Is.); Notocrypta paralysos mangla (N. Kanara, India); N. p. teuta (Nias); N. clavata theba (E. Dawnas, Burma); N. curvifascia corinda (N. Korintji Valley, S. W. Sumatra); N. renardi roona (Roon Is.); N. waigensis wanga (25 mi. from Wangar, Nomnagihé, Dutch New Guinea); N. maria (Owgarra, Br. New Guinea); Scobura cephaloides kinka (Tonkin); Suada swerga suava (King Is., Mergui); S. s. sedata (Liwa, Sumatra); Hyarotis microgtictum coorga (Sati R., Coorg, India); Isma obscura fonta (Sumatra); I. o. vulsina (Mt. Gedé, Java); Plastingia mangola (Sula Mangola); P. tessellata tessa (Sangir Is.); Lotongus calathus balta (Kanbauk, Tavoy); Gangara thyrsis pandina (Java); Matapa cresta (Sikkim); Unkana ambasa tranga (Nias); Hidari doesoena gloria (Kina Balu, Borneo); Acerbas anthea pista (Hoop Bon, Siam); A. durix dorka (Pulo Laut, Borneo); A. selta (Lawas, Borneo); Pirdana distanti spenda (Kawkereik, Dawnas, Burma); Cyrina cyrina corpa (Borneo); Prada rawlinsonia (Rawlinson Mts., New Guinea); Thymelicus actaeon orana (Algeria); T. leonina tatsia (Ta Tsien Lou, China); Hesperia comma shandura (Shandur Pass, Chitral); Ochlodes subhyalina pasca (Khasi Hills, Assam); O. thibetana sanka (Htawgaw, Burma); O. siva tarsa (Pochu Valley, S. E. Tibet); Taractrocera ziclea bessa (Toekan Bessi, Dutch E. Indies); Ocybadistes flavovittata kokoda (Kokoda, New Guinea); Oriens fons (Los Banos, Luzon); Potanthus omaha bione (Mindanao); P. taxilus rabida (Batjan); P. mara kansa (Kwei Chow, China); P. ganda marla (Borneo); Telicota doba (Dobo, Aru Is.); T. colon stinga (Malacca); T. c. vega (New Ireland); T. c. zara (St. Mathias Is.); T. augias florina (S. Flores); T. linna linna (Sikkim); T. l. besta (Hainan); T. l. bina (Sumatra); T. l. bactra (Java); T. l. bodra (Borneo); T. ancilla volens (Timor); T. a. baudina (Baudin Is., N. Australia); T. a. mamba (Biagi, Mambara R., New Guinea); T. vinta (Kapaur, Dutch New Guinea); T. ohara lix (Sikkim); T. o. vedanga (Java); T. o. jactus (Kina Balu, Borneo); T. o. jania (Mindanao); T. o. iona (Kezeli, Buru); T. o. ixion (Upper Aroa R., New Guinea); T. kezia kezia (Mt. Mado, Buru); T. k. lenna (Talesea, New Britain); T. ternatensis ranga (Sangir, Dutch E. Indies); T. t. sula (Sula Mangoli); T. t. aruba (Aru Is.); T. t. solva (Florida Is., Solomons); T. t. fenia (Feni, New Ireland); T. sadra (New Guinea); T. gervasa (Duke of York Is.); Cephrenes augiades tugela (Tugela Is., Solomons); Pastria pastria (Mambare R., Br. New Guinea); Banta banta (Angabunga affluent, St. Joseph R., Hydrographer Mts., Br. New Guinea); Kobrona denva (Edie Creek, Central New Guinea); K. pansa panta (Edie Creek, Central New Guinea); K. edina (Edie Creek, Central New Guinea); K. vanda (Edie Creek, Central New Guinea); K. croma (Zegeheme, Cromwell Mts., New Guinea); K. idga (2 days N. of Fak-Fak, Dutch New Guinea); Sabera fuliginosa chota (Biagi, Mambare R., New Guinea); S. bicolor misola (Misol); S. kumpia kumpia (Mt. Kumpi, Menoo R., Weylandt Mts., New Guinea); S. k. baxta (Biagi, Mambare R., New Guinea); S. biaga (Biagi, Mambare R., New Guinea); S. aruana lina (Mt. Lina, Cyclops Mts., Dutch New Guinea); S. dobboe handva (New Hanover); Mimene biakensis gunta (German New Guinea); Parnara guttatus batta (Kuatuni, Fukien); P. g. andra (Matang Rd., Borneo); Pelopidas agna dingo (head of Aroa R., New Guinea); P. thrax masta (Imphal, Manipur); Polytremis pellucida quanta (Kwangtseh, Fukien). Considerable revision has been done; e.g. Eugchemon is included in a group of genera in the Pyrginae. The polytypic species concept is adopted; related forms which represent each other geographically are treated as subspecies. The location of each holotype is given. There is a bibliography and list of accessions, and a list of spp. not determined or found to be extralimital. 132 previously unfigured spp. and sspp. are illustrated in color. The ♂ genitalia of all but 2 spp; and of many sspp. are figured. [P.B.]

49. Ferreira d'Almeida, R. F., and José Oiticica F., "The International Commission on Zoological Nomenclature and the Name of the Monarch Butterfly." Science, vol. 113: pp.728-729. 22 June 1951. Protest against the suggestion by the secretary of the Commission that type and type locality of plexippus be fixed again, to correct an earlier error; in this case, the suggested type specimen still does not come from the type locality! [P.B.]

50. Field, William D., J. F. Gates Clarke, and J. G. Franclemont, "On a Recent Proposal to Correct an Error Committed By the International Commission on Zoological Nomenclature at the Paris 1948 Meeting." Science, vol.113: pp.68-70. 19 Jan. 1951. Discussion of Hemming's attempt to settle the application of "Danaus plexippus"; the authors give reasons for the restriction of this name to the Oriental insect ("genutia") and the use of menippe for the Monarch. [P.B.]

RECENT LITERATURE ON LEPIDOPTERA - cont.

51. Franclemont, John G., "A New Generic Name (Lepidoptera, Phalaenidae, Acontiinae)." Proc. Ent. Soc. Wash., vol.52: pp.271-272. 25 Oct. 1950. Proposes THIOPTERA to replace Xanthoptera, a homonym. [P.B.]
52. Franclemont, John G., "Notes on Some Genera and Species of Eastern Moths with Descriptions of New Species (Lepidoptera, Phalaenidae)." Bull. Brooklyn Ent. Soc., vol.45: pp.144-155, 9 figs. Dec. 1950. Describes as new: Procus crytora (New Brighton, Pennsylvania); Zale phaeocapna (New Brighton, Pennsylvania); Figures genitalia of both and of P. semicana. The following name changes must be made: Procus for Oligia; Meropleon for "Oligia" diversicolor and ambifusca; Apamea for Septis; A. amputatrix for "S." arctica; Amphipoea for Apamea; Zenobia for Ipimorpha; SUNIRA for Rusina circellaris and North American spp.; Unca for Erastria and Lithacodia: Zale lunifera for Z. cingulifera; Z. lineosa for Z."lunifera"; Caenurgia chloropha for C. convalescens. [P.B.]
53. Franclemont, John G., "The Species of the Leucania unipuncta group, with a Discussion of the Generic Names for the Various Segrates of Leucania in North America (Lepidoptera, Phalaenidae, Hadeninae)." Proc. Ent. Soc. Wash., vol.53: pp.67-85, 11 pls. Apr. 1951. Describes as new: PSEUDALETIA (type Leucania unipuncta Haworth); P. unipuncta quechua (Incachaca, Cochabamba, Bolivia); P. cunyada (Bogotá, Colombia); P. roraimae (Mt. Roraima, Brazil); P. sequax (Jalapa, Mexico); P. australis (Port Victor, South Australia); P. idisana (Baguio, Luzon, Philippines). New genus also includes 'Leucania' antica (unipuncta ssp.), adultera, punctulata and separata. Reviews all generic names applied to the Leucania group of genera. Presents a revised checklist of North American spp., divided on the basis of ♂ genitalia among Faronta (= Protoleucania), with aleada, tetra, diffusa, rubripennis and quadrannulata; Pseudaletia; Aletia, with oxygala and yukonesis; and Leucania (remaining spp.). Figures ♂ and ♀ genitalia of all entities in Pseudaletia, and of 10 representatives of related genera. [P.B.]
54. Hardwick, D. F., "Preparation of Slide Mounts of Lepidopterous Genitalia." Canad. Ent., vol.82: pp. 231-235. Nov. 1950. Comprehensive directions; applicable mainly to Macrolepidoptera. [P.B.]
55. Hemming, Francis, "On the proposal that the trivial name ajax Linnaeus, 1758 (as published in the binominal combination Papilio ajax) should be suppressed by the International Commission on Zoological Nomenclature under its plenary powers." Bull. Zool. Nomenclature, vol.2: pp.29-30. 20 Apr. 1951. See Corbet, no. 45 above. Suggests alternatively that ajax be affixed to "the Nearctic species to which it is now usually applied" but does not state whether marcellus or polyxenes would be supplanted. [P.B.]
56. Herbulot, C.,"On the Presence of Middle Spurs in the Hind Tibiae of a Male Scopula (Lep. Geometridae)." Entomologist, vol.83: p.225. Nov. 1950.
57. Hinton, H. E., "Myrmecophilous Lycaenidae and Other Lepidoptera - a Summary." Proc. Trans. South London Ent. Nat. Hist. Soc., 1949-50: pp.111-175, 9 figs. Apr. 1951. Following a discussion of theoretical considerations, and descriptions of larval and pupal organs of importance in the ant-lycaenid relationship, the author summarizes all known life histories of myrmecophilous Lycaenidae, plus those of predaceous forms and those which feed upon secretions of other insects, plus what little (relatively) is known about myrmecophily in other families of Lepidoptera. There is a bibliography of all important papers on the subject up to 1947, and an index to spp. of Lepidoptera and ants mentioned. A fascinating and invaluable paper. [P.B.]
58. Hoffmeyer, Skat, "Problems in Danish Macrolepidoptera." Entomologist, vol.83: pp.193-198. Sept. 1950.
59. Huggins, H. C., "Sterrha muricata Hufnagel in England." Entomologist, vol.83: pp.234-235. Oct. 1950.
60. Hyde, George E., "A Cynandrous Agrotis puta Hübner." Entomologist, vol.84: pp.23-24. Jan. 1951.
61. Kiriakoff, S. G., "Recherches sur les organes tympaniques des Lépidoptères en rapport avec la classification. VI. Nyctemeridae" [In French]. Bull. Ann. Soc. Ent. Belg., vol.87: pp.106-129. 5 July 1951. Considers the following groups, usually placed as subfamilies of the Arctiidae, as tribes in the family Nyctemeridae: PERICOPINI (with subtribes AGANEIDES (= 'Hypsidae') and PERICOPIDES), CALLIMORPHINI, and NYCTEMERINI . Discusses classification and phylogeny, basing his conclusions on a study of the tympanum of representatives of 33 genera. [P.B.].
62. de Lesse, H., "Expeditions polaires françaises (Missions Paul-Émile Victor). Zoologie. - 4e note. Macrolepidoptera" [In French]. Ann. Soc. Ent. France, vol.118: pp.54-78, 38 figs. 1951. Describes as new Operophtera groenlandica. Extensive notes on the 19 spp. collected on the northwest coast of Greenland, belonging to the Pyralidae, Geometridae, Phalaenidae, Lymantriidae, Nymphalidae and Pieridae. Figures ♂ and ♀ genitalia of almost all spp., and setal pattern of O. groenlandica larva. [P.B.]
63. de Lucca, C., "A contribution to the list of Maltese Lepidoptera." Ent. Mo. Mag., vol.86: pp.232-233. Aug. 1950. 25 new records. [P.B.]
64. de Lucca, C., "Additional Records of Micro-Lepidoptera of the Maltese Islands (Heterocera)." Entomologist, vol.83: pp.249-251. Nov. 1950. 14 new records. [P.B.]
65. McDonald, Howard, "Biology and Control of Heliothis ononis Schiff., an Important New Pest of Flax in Western Canada." Ohio State U. Abs. Doct. Diss., no.53: pp.231-240, 5 figs. 1947.
66. McDunnough, James H., "On the Identity of Agrotis pyrophiloides Harvey (Lepidoptera, Agrotinae)." Bull. Brooklyn Ent. Soc., vol.46: pp. 19-20. Feb. 1951. Notes on type and genitalia of this Pronoctua.
67. McElvare, Rowland R., "Note on Chlorocleptria jaegeri." Bull. Brooklyn Ent. Soc., vol.46: p.28. Feb. 1951.
68. McElvare, Rowland R., "Notes on Heliothiinae - more recent records of rare species." Bull. Brooklyn Ent. Soc., vol.46: p.51. Apr. 1951. Records of four spp. from southern United States. [P.B.]
69. Mackay, Margaret R., "Species of Eupithecia reared in the Forest Insect Survey in British Columbia (Lepidoptera: Geometridae)." Canad. Ent., vol.83: pp.77-91, 4 pls. Apr. 1951. Describes as new: E. transcanadata (Fernie, Kootenai Dist., B. C.); E. pseudotsugata (Otter L., Kamloops Dist., B. C.); E. harrisonata (Harrison L., New Westminster Dist., B. C.); E. columbiata holbergata (Holberg Inlet, Vancouver Is.); E. vinsullata (Vinsulla, Kamloops Dist., B. C.); E. kananaskata (Kananaskis, Alberta). Describes the ♀ of E. usurpata. Summarizes the spp. of the filmata group. Adults and genitalia of these spp. are figured. Food plants are recorded for the above and for a number of other spp. [P.B.]
70. Munroe, E. G., "A previously unrecognized species of Nymphula (Lepidoptera, Pyralidae)." Canad. Ent., vol.83: pp.20-23, 1 pl., 2 figs. Jan. 1951. Resurrects N. curviferalis (Walker) from synonymy under N. badiusalis; describes both, figuring adults and ♂ genitalia. [P.B.]

71. Munroe, Eugene G., "The systematics of Calisto (Lepidoptera, Satyrinae), with remarks on the evolutionary and zoogeographic significance of the genus." Journ. N. Y. Ent. Soc., vol.58: pp.211-240. 19 Feb. 1951. Describes as new C. smintheus bradleyi (Rio Tacoluco, Sierra Range, Pinar del Rio Province, Cuba). Gives characters of genus, and key to spp. and sspp. Lists all known forms, with notes. Discusses distribution and speciation. Genus is confined to the Antilles, with center in Hispaniola, which has the only primitive spp. This distribution may be explained by the size of the island, its relative stability geologically, and its mountainous terrain, which has permitted local subspeciation. The other islands have lost their original fauna in geologic changes. [P.B.]

72. Munroe, Eugene G., "North American Pyraustinae: notes and descriptions (Lepidoptera: Pyralidae)." Canad. Ent., vol.83: pp.161-169, 1 pl., 14 figs. July 1951. Describes as new: CYLINDRIFRONS (type Botis succandidalis Hulst); Pyrausta perrubralis sannichalis (Duncan, British Columbia); Titanio criddlealis (Aweme, Manitoba); Noctuelia atascaderalis (Atascadero, Calif.). The following changes are made: Pionea helvalis, type of Framinghamia; Spilodes palindialis, type of Trischistognatha (these resurrected genera are redescribed); Pyrausta unimacula to Evergestis; Titanio ephippialis to Loxostege; P. socialis removed from synonymy; P. funebris glomeralis is the distinct North American ssp. Discusses 3 ssp. of P. perrubralis. Figures adults of new spp. and ssp. and 6 other forms, ♂ genitalia of 12 spp., and heads of 4. [P.B.]

73. Paclt, Jiří. "A new family name in Lepidoptera." Ent. Berichten, vol.13: p.219. 1 Feb. 1951. Proposes TETHEIDAE for Palimpsestidae (= Cymatophoridae, Thyatiridae, Polyplocidae); adds a survey of European genera. [A.D.]

74. Rawson, George W., and Sidney A. Hessel, "The life history of Strymon cecrops Fabricius (Lepidoptera, Lycaenidae)." Bull. Brooklyn Ent. Soc., vol.46: pp.79-84, 1 pl., 1 fig. June 1951. Describes early stages, with figures of each. Habits of larva and adult are discussed. [P.B.]

75. Rindge, Frederick W., "A change in synonymy in Drepanulatrix (Lepidoptera, Geometridae)." Journ. N. Y. Ent. Soc., vol.59: pp.63-64. 25 June 1951. D. ella is probably a northern ssp. of D. bifilata. [P.B.]

76. Silva, Pedrito, "Stenoma decora Zeller (Lep. Stenomatidae), uma nova praga potencial do cacaueiro na Baia, Brasil" [In Portuguese, English summary]. Revista Ent., vol.17: pp.361-374, 16 figs. 'Dec. 1946' [20 Jan. 1947]. Describes larva, pupa and adults in detail. Food plants Theobroma leiocarpa, Ceiba pentandra. Discusses systematic position, distribution, and habits. Records 1 parasite. [P.B.]

77. Sperry, John L., "Geometrid notes." Bull. So. Cal. Acad. Sci., vol.50: pp.50-53. 20 Apr. 1951. Describes as new Chlorochlamys hesperia (Borrego, California). Revisional notes on Chlorochlamys, and notes on three other species. [P.B.]

78. Stempffer, H., "Contribution à l'étude des Lycaenidae de la faune éthiopienne (Lep.)." [In French]. Bull. Soc. Ent. France, vol.52: pp.35-41. 20 May 1947. Describes as new: Anthene livida galla (Maji, Abyssinia); A. otacilia benadirensis (Afkoi, Italian Somaliland); A. lachares toroensis (Bwamba, Toro, W. Uganda); Neurellipes standingeri obsoleta (Kakamega, Kavirondo, Kenya); also two 'forms'. Describes the previously unknown ♂♂ of Eresina bilinea and E. crola, and ♀♀ of Anthene kampala and A. katera. Several additional notes. [P.B.]

79. Tilden, James W., "The insect associates of Baccharis pilularis de Candolle." Microent., vol.16: pp. 149-185. 12 Apr. 1951. Lists, among other insects, 23 spp. of Lepidoptera feeding on this plant. Oinophila v-flavum is a new American record. Records parasites and feeding habits, and other aspects of the ecology of this community. [P.B.]

80. Turner, A. Jefferis, "Revision of Australian Lepidoptera. Oecophoridae. XIV." Proc. Linn. Soc. N. S. Wales, vol.72: pp.143-158. 15 Sept. 1947. Treatment of the 'Depressiades' group. Describes as new: ANCISTRONEURA, and type species A. thaumasia (Macpherson Range, Queensland; Sidney); A. ammophara (Kuranda, N. Queensland); IDIOCHROA, I. anthina (Nambour, Mt. Tamborine, and Brisbane, Queensland); Pholeutis aprepta (Macpherson Range, Queensland); P. leucoprepta (Macpherson Range, Queensland); P. acroprepta (Macpherson Range, Queensland); LEUROBELA (type holophaea Turn.); L. clasomita (Macpherson Range, Queensland); L. puncta (Stannary Hills, N. Queensland); DYSTHRENETA, D. Lepta (Kuranda, N. Queensland); DELOPHANES (type not specified; anthracephala Lower only sp. listed); Eutorna dysphanes (Bunya Mts., Queensland); E. plumbea (Albany, and Denmark, W. Australia); MACROBELA, M. abrupta (Perth); Eupselia beltera (Charleville, Queensland); E. axiepaena (Toowoomba, Queensland); E. metabola (Emerald, Dalby, Talwood, and Stanthorpe, Queensland; Adelaide; Perth); PROGONICA, P. niphostibes (Stanthorpe, Queensland); BLEPTOCHITON, B. leucotrigona (Eugella, N. Queensland): Thudaca monolechria (Cape York, N. Queensland); T. rubrilinea (Cunderdin, W. Australia); T. cryeropis (Maryland, N. S. Wales); T. litodes (Emerald, Queensland); ACRAEPHNES, and type sp. A. nivea (Rockhampton, Emerald, and Stanthorpe, Queensland; Tenterfield and Brunswick Hds., N. S. Wales); A. nitida (Waroona, W. Australia); HAERETA, and type sp. H. cryphimaea (Mt. Tamborine, Queensland); H. niphosceles (Lake Barrine, N. Queensland); H. inscripta (Ooldea, S. Australia); BRACHYZANCLA, and type sp. B. poenicea (Bunya Mts., Queensland); B. sporima (Stanthorpe, Queensland); B. acrocossa (Goodna and Toowoomba, Queensland); B. dysgenes (Toowoomba, Queensland); B. leptodes (Macpherson Range, Queensland); B. placophora (Linsmore, N. S. Wales); B. baea (Broken Hill, N. S. Wales); Peritorneuta lissopis (Duaringa, Jandowae, Injune, and Bollon, Queensland); Cryptolechia striata (Brisbane); C. amaurophanes (Murrurundi, N. S. Wales); C. epinephela (Mt. Tamborine and Macpherson Range, Queensland); C. irobela (Kalamunda, W. Australia); C. brachymita (Perth); C. leptosticta (Cooktown, Kuranda, and Lake Barrine, N. Queensland); C. inquinata (Kuranda, N. Queensland). Location of type specimens not always stated; specimens not otherwise mentioned. Type localities not specified; all recorded localities are given above. 31 genera listed, with descriptions, references, and a key to all but Analcodes (said to be 'weak'); 143 spp. listed, with references and localities. [P.B.]

81. Wakely, S., "Eucnaemidophorus (Platyptilia) rhododactyla Schiffermüller." Entomologist, vol.83: pp.236-237. Oct. 1950. Life history notes. [P.B.]

82. Williams, C.B., "Changes in insect populations in the field in relation to preceding weather conditions." Proc. Roy. Soc. Lond. B, vol.138: pp.130-156, 9 figs. 15 Feb. 1951. Changes in total insect population as measured by light-trap captures are closely correlated with rainfall and minimum temperature in the preceding three months. [P.B.]

83. Williamson, Margaret, The First Book of Bugs. 45 pp.; ill. Franklin Watts, New York. 1949.

84. Woke, Paul A., "Notes on a migratory flight of Urania fulgens Walker (Uraniidae) on the Isthmus of Panama, Central America." Proc. R. Ent. Soc. Lond. (A), vol.26: pp.38-39. 16 Mar. 1951. Flight involved millions of individuals and lasted well over a month. [P.B.]

OFFERINGS AND NEEDS OF MEMBERS

Lepidopterists' Society members may use this page free of charge to advertise their offerings and needs in Lepidoptera. The Editors reserve the right to rewrite notices for clarity or reject unsuitable notices. Unless withdrawn sooner by the member, each notice will appear in three numbers. We can not guarantee any notices but expect all to be bona fide. Please notify us of any abuse of this service.

I will pay LEPIDOPTERISTS' SOCIETY DUES for foreign (or N. American) collectors in exchange for shipment of butterflies of equal value, or will pay cash direct. Want butterflies from any tropical island, Africa, and Indo-Australia, Central and South America; NOT Europe at present. Also want North American species in quantity, esp. Papilio. Must be first quality, in papers. Want all families but esp. Nymphalidae, Papilionidae, Morphidae, and Saturniid moths; also other large insects. Will advance money to any good collector. Send list and prices in first letter. A. Glanz, Butterfly World Supply House, 289 E. 98th St., Brooklyn 12, New York.

- -

Japanese Rhopalocera and some moths, including Japanese (and including Formosan) Rhopalocera and some moths offered in exchange for Rhop. and some moths from all parts of the world. Especially Satyridae, Lycaenidae, Papilionidae, Nymphalidae, Pieridae, Saturniidae and Arctiidae. Seiji Ishida, 33 Nakayamachô, Saga, Ukyô-ku, Kyoto City, JAPAN.

- -

Austrian hunter and collector (not dealer) in Amazon and Matto Grosso districts of Brazil takes orders for Lepidoptera and other insects, all with full locality and date. Also supplies amphibians, reptiles and various terrarium animals. Write (in German if possible) to: Walter A. Riffler, Tecnico Zoológico, Caixa Postal 500, Belem, Parà, BRAZIL.

- -

Huge AFRICAN LEPIDOPTERA collection for sale; over 2000 moths and 5400 butterflies. About 250 types, with complete data, all on pins. Will sell in part or complete, including 120 glass cases. Also, rare books on African Lepidoptera. Ari W. Kampf, Franz Jurgens Strasse 12, Dusseldorf, GERMANY.

- -

AUSTRALIAN LEPIDOPTERA for sale, papered or pinned, perfect specimens, with data, 10¢ each. Write stating needs; Victorian species only offered.
Ian Harman, c/o Mrs. A.H. Bisdee, Appletree Cottage, Dorset Road, Croydon, Victoria, AUSTRALIA.

- -

Exchange desired in all groups of Macros, esp. Geometridae. Lepidoptera from COLORADO (Parnassius, Colias, Oeneis, etc.), ILLINOIS, and southern INDIANA offered in trade. Ronald H. Leuschner, 1172 S. Wenonah Ave., Oak Park, Illinois.

- -

Wanted to buy: SEITZ' "Macrolepidoptera of the World", Vols. 1, 9, 13, English translation. George H. Berg, Rm. 319, Custom House, New Orleans 16, La.

- -

MEGATHYMUS WANTED - specimens of this genus from all localities. Will buy or exchange. Have Megathymus for exchanges.
Don B. Stallings, Caldwell, Kansas.

GENITALIC VIALS: On Nov. 1st I shall place an order with Kimble Glass Co. for following sizes of vials:

1. 3-3/4 to 4-1/2 by 10 ± 2 mm.
2. 6-1/4 to 7 by 15 ± 2 mm.
3. 7-1/4 to 8 by 18 ± 2 mm.
4. 1/4 dram; 9 x 30 mm.

Anyone wanting some of these vials should notify me so I can include his order with mine, as these are made on special order. (I will make no extra charge.)
Kent H. Wilson, 823 East "B" St., Moscow, Idaho.

- -

MEGATHYMUS YUCCAE ALABAMAE ex-pupae 1951, perfect, spread. Want exotics and Gulf States rarities in exchange.
H.W. Eustis, 2301 Woodbine Rd., Augusta, Georgia.

- -

BUTTERFLIES FROM ARCTIC and Far North especially Oeneis, Erebia, Boloria, at reasonable prices. R.J. Fitch, 2235 Pandora St., Vancouver, B.C., CANADA.

- -

Wanted: Seitz' "Macrolepidoptera of the World", esp. Vols. 1, 2, 6, 9, 13, English Translation.
G.F. Schirmer, 2912 N. 45th St., Milwaukee 10, Wis.

- -

Lepidoptera of the SOUTHWEST U.S.A. for sale, papered or pinned. Lots of 100, either Rhopalocera, Macros, or Micros, priced low, full data.
F.P. Sala, 1764 Colorado Blvd., Los Angeles 41, Cal.

- -

Speyeria diana, S. cybele leto and letona, and S. nokomis nitocris, ♂♂ and ♀♀ with full data, offered in exchange for needed species of Erebia and Oeneis, esp. the following numbers from McDunnough 1938 list: 127b-e; 130a-c; 135a; 136a; 138b,c; 140, 143a; 144b-c; 147; 147a; 149b-d; 151, 152. Also need any of forms recently described by dos Passos except taygete fordi and rossii gabrieli. If you have some of these species but are not interested in the Speyeria, send list of desiderata.
Paul R. Ehrlich, 538 Academy St., Maplewood, N.J.

- -

Bio Metal standard redwood insect box, new style, 9 x 13 x 2-1/2 inches. Screw on hinge. $2.25 each, $25/doz. Also Cornell drawers and unit pinning trays. Equipment constructed to order. Bio Metal Associates, Box 346, Beverly Hills, Calif.

LIVING MATERIAL

The Editors will welcome especially notices for the exchange or sale of Lepidoptera eggs, larvae, and pupae, hoping to revive the old interest in rearing and to re-emphasize the importance of studying the immature stages. Contributors are urged to include accurate locality data with all material sent.

Wanted to buy: cocoons of U.S.A. Saturniidae, pupae of Sphingidae, Papilio chrysalids, Catocala eggs, Hemileuca maia egg rings. Will exchange best make rust-proof steel pins Nos.0-7, value $4.00 per thousand, for cocoons and Coleoptera.
Eugene Dluhy, 3912 N. Hamilton, Chicago 18, Illinois.

QUESTIONS FOR PROFESSOR FORBES

Q. "Do you believe that the Viceroy (Limenitis archippus) mimics the Monarch (Danaus plexippus)? Are there other North American butterflies that mimic protected species?"

A. I believe it is a Müllerian mimic (resemblance between two protected butterflies, to the advantage of both), but that the Monarch is the dominant partner. In Florida and the Southwest other races of the Viceroy mimic the local races of the Queen. I believe also that there is a mimicry group (partly Müllerian, partly Batesian) surrounding the Green Swallowtail (philenor). This includes Papilio troilus, Limenitis astyanax, P. glaucus, and in a degenerate way P. polyxenes. I believe that mimicry is best developed in the tropics, where there are more butterfly-eating birds, and also the monkeys, and that in North America it may be partly a left-over from an earlier geological period when it was much warmer here, and is therefore now degenerating.

In the moths we also have local mimics of Hymenoptera (the Aegeriidae, and perhaps best of all Cisseps fulvicollis, which in life is a very good mimic of Polistes). Also Lycomorpha pholus is a (perhaps degenerate) mimic of Calopteron beetles; many tropical relatives are effective mimics of Lampyridae.

Q. "In the spreading of Colias and some other species, there is a staining of the hind wings where they come in contact with the body while in the relaxing jar. What can be done to remove this stain?"

A. You do not state what type of stain. Grease, soaking out from the body, can be easily removed by any fat solvent, such as pure gasoline or benzol. I drop papered material in the solvent, leave some hours, blot off and dry; for spread material I prefer to lay out the specimen on an old setting board (a size or two over-size) with pads of cellucotton below and above the wings and over the body; then soak the whole with benzol or chloroform, cover the wing pads with glass (microscope slides) and leave till dried out. Then remove the pads and the grease will have been drawn out into the pads. If the stain is cyanide (scarlet if not too heavy) there is no remedy; - clean up your cyanide bottle.

W.T.M. Forbes

In reference to the Question and Answer column of the News, vol.4: p.60, it should be noted that Papilio (Menelaides) alcinous Klug feeds on Aristolochia in Japan. It is the sole representative of the "Pharmacophagous" group in our country. Dyar remarks that its larva is allied to the American philenor. It resembles a "partially ripe mulberry" as Pryer states and is by no means an orange-puppy. There are seven orange-family feeders in our fauna: P. xuthus, protenor, macilentus, maackii, bianor, helenus, and memnon. They are all members of the Fluted Papilios, among which the adult of macilentus alone somewhat resembles the alcinous ♂ (and the southern form of the ♀).

Tarō Iwase
Kanagawa-ken, Japan

ADDRESS CHANGES

Arntz, A., 516 Prospect Ave., Syracuse 8, N.Y.
Berg, G., Room 319, Custom House, New Orleans 16,La.
Clench, H., Section of Insects and Spiders, Carnegie Museum, Pittsburgh 13, Pa.
Euting, N., Route 2, Box 110, Oconomowoc, Wis.
Halbert, R., 2444½ Cudahy St.,Huntington Park, Calif.
Hayes, J., 7522 Forest Preserve Dr., Chicago 34, Ill.
Jablonski, R., 1018 E. Ogden Ave., Milwaukee 2, Wis.
Kesselring, J., Caixa Postal 6, João, Pessoa, Paraíba, BRASIL.
Kimball, C., Route 4, Box 299, Sarasota, Fla.
Lambert, R., Dept. of Agriculture, Systematic Entomology, Science Service, Ottawa, Ont., CANADA.
Laspe, C., 1326 Granada, Long Beach 4, Calif.
Mills, K., 2010 Hudson St., Charleston 2, W.Va.
Nicolay, S.(Lt.Col.), Hdqts.Sqd.,MCAS, Quantico, Va.
Robinson, P., Ring Factory Rd., R.D. #2, Bel Air, Md.
Rockingham, N., H.M.A.S. "Australia", c/o G.P.O., Sydney, N.S.W., AUSTRALIA.
Rutkowski, F., 5723 McVicker Ave., Chicago 30, Ill.
Smith, A., 454 K St., Los Baños, Calif.
Travassos F°, L., Dept. de Zoologia, Secr. da Agricultura, Caixa Postal 7172, São Paulo, BRASIL.
Wren, G., 700 Pierce St., Gary, Ind.

ADDITIONS TO THE MEMBERSHIP LIST

Bakeless, John(Dr.), Great Hill, R.D.2, Seymour,Conn.
Burdick, W.N., 1108 S. Harvard Blvd., Los Angeles 6, Calif.
Burkhardt, V.J.(Col.), c/o Mme. Natasha du Breuil, 6, Basilea, Lyttelton Rd., HONG KONG.
Carman, J.D. (Mrs.), Route 2, Sunnyside, Wash.
Covell, Charles V.,Jr., Box 569, Southern Pines, N.C.
Dane, Benjamin, Indian Ave., Middletown, Rhode Island.
Duke, Arthur, 17 St.Bede's Rd., Three Anchor Bay, Cape Town, SOUTH AFRICA.
Ely, Frank (Mrs.), Endeavor, Wis.
Fujioka, Tomoo, Ho-13, 10 Nishikata-machi, Bunkyo-ku, Tokyo, JAPAN.
Garthe, William, Hanover Road, Hanover, N.J.
Glanz, A., 291 E. 98th St., Brooklyn 12, N.Y.
Harman, Ian, c/o Mrs. Bisdee, Appletree Cottage, Dorset Rd., Croydon, Victoria, AUSTRALIA.
Ishida, Seiji, 33 Nakayama-chô, Saga, Ukyô-ku, Kyoto City, JAPAN.
Kampf, Ari W., Franz Jurgens Strasse 12, Düsseldorf, GERMANY.
Koerber, Thomas, 1627 N. 24th Pl., Milwaukee 5, Wis.
Linsdale, Donald D., Jamesburg Route, Hastings Reservation, Robles del Rio, Calif.
Nations, A.W., Box 42, Donna, Texas.
Nevola, Salvatore T., 146-43 182nd St.,Jamaica 5,N.Y.
Patterson, Lois M. (Mrs.), 524 Maple Blvd., Kansas City 1, Mo.
Ruetimeyer, Ernest, 38, Rue Fédérale, Berne, SWITZERLAND.
Scott, Arthur H., 20 Bishop Pky., Pittsfield, Mass.
Taylor, Herbert S., 1369 Fair Ave., Columbus, Ohio.
Valletta, Anthony, 257 Msida St. B, B'Kara, MALTA.
Walcott, Charles, 81 Sparks St., Cambridge 38, Mass.
Wheaton, William, Saco, Montana.

DECEASED

Romieux, Jean (Switzerland).

THE LEPIDOPTERISTS' SOCIETY

The object of the Lepidopterists' Society, which was formed in May, 1947, and formally constituted in December, 1950, is "to promote the science of lepidopterology in all its branches, ... to issue a periodical and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to secure cooperation in all measures" directed toward these aims (Constitution, Art.II). A special goal is to secure free interchange among the lepidopterists of all countries.

Membership in the Society is open to all persons interested in any aspect of lepidopterology. Prospective members must be nominated by two members in good standing and then become members by paying the current annual dues. Memberships are for full calendar years only. All members in good standing receive The Lepidopterists' News. Institutions may subscribe to the publications but may not become members. Applications for membership should be sent to the Secretary, and all correspondence concerning membership and general Society business should be directed to him. Completed membership forms and remittances should be sent directly to the Treasurer. All remittances should be made payable to: The Lepidopterists' Society. There are three paying classes of membership:

Active Members - annual dues $2.00 (U.S.A.)
Sustaining Members - annual dues $5.00 (U.S.A.)
Life Members - single sum $50.00 (U.S.A.)

The minimum fee for Active Members is not sufficient to finance the News and other Society activities. Nevertheless, this fee is kept low so that cost of membership will not be burdensome to any member, regardless of monetary difficulties in his country or private economic reasons. Obviously, the Sustaining Members make up the difference. A large proportion of the Society members have always maintained themselves generously in the Sustaining category. Members not yet Sustaining are earnestly urged to consider elevating their class of membership.

Each year a list of all members of the Society is published, with addresses and special interests.

An Annual Meeting is held each year at which election of officers and presentation of papers and exhibits take place. All members of the Society are expected to vote for officers when mail ballots are distributed by the Secretary. Special Meetings may be called by the Secretary on receipt of a written request from the President or signed by ten members.

NOTICE TO CONTRIBUTORS TO THE NEWS

Contributions to The Lepidopterists' News may be on any aspect of the study and collection of Lepidoptera in any part of the world, except that papers describing new species, genera, etc., or proposing nomenclatural changes, should be published in more formal journals and will not be accepted for the News. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (e.g., mimicry, wing venation); 2) field notes of more than a very local nature; 3) notes on well-tested techniques; and 4) news of lepidopterology (e.g., personalia, societies, new periodicals). Line drawings are easily handled in the News; authors should write the Editor for details concerning the correct size for original drawings. Photographs should be very sharp and have good contrast.

Manuscripts should be typed if possible, but clear hand-written manuscripts are acceptable. ALL MANUSCRIPTS SHOULD BE DOUBLE-SPACED (blank lines alternating with written lines), and wide right and left margins are needed.

Ordinarily, manuscripts should be in English. However, the editors will translate short notes which are received in French, German, Spanish, Portuguese, or Russian. Authors of longer manuscripts who do not find English easy should prepare an English manuscript and permit the editors to correct the writing. Brief summaries in non-English languages are always welcomed at the end of any paper.

Authors may request in advance about 75 gratis separates of any paper over one column in length. Additional separates are available IF ORDERED IN ADVANCE, at the rate of $3.00 per hundred for papers of any number of pages within a single issue. Ordinarily, the cost of photographs will be charged to authors, but the rate is low. There is no extra cost for line drawings.

The editors reserve the right to adjust style (citation of references, italicizing names, etc.) to fit News standards of uniformity.

TABLE OF CONTENTS — SOMMAIRE — INHALT

VOLUME 5 1951 NUMBERS 6-7

The LEPIDOPTERISTS' NEWS

Published by THE LEPIDOPTERISTS' SOCIETY
Publié par LA SOCIÉTÉ DES LÉPIDOPTÉRISTES
Herausgegeben von der GESELLSCHAFT DER LEPIDOPTEROLOGEN

IN THIS ISSUE

NOTICE TO CONTRIBUTORS TO THE NEWS

Contributions to The Lepidopterists' News may be on any aspect of the study and collection of Lepidoptera in any part of the world, except that papers describing new species, genera, etc., or proposing nomenclatural changes, should be published in more formal journals and will not be accepted for the News. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (e.g., mimicry, wing venation); 2) field notes of more than a very local nature; 3) notes on well-tested techniques; and 4) news of lepidopterology (e.g., personalia, societies, new periodicals). Line drawings are easily handled in the News; authors should write the Editor for details concerning the correct size for original drawings. Photographs should be very sharp and have good contrast.

Manuscripts should be typed if possible, but clear hand-written manuscripts are acceptable. ALL MANUSCRIPTS SHOULD BE DOUBLE-SPACED (blank lines alternating with written lines), and wide right and left margins are needed.

Ordinarily, manuscripts should be in English. However, the editors will translate short notes which are received in French, German, Spanish, Portuguese, or Russian. Authors of longer manuscripts who do not find English easy should prepare an English manuscript and permit the editors to correct the writing. Brief summaries in non-English languages are always welcomed at the end of any paper.

Authors may request in advance about 75 gratis separates of any paper over one column in length. Additional separates are available IF ORDERED IN ADVANCE, at the rate of $3.00 per hundred for papers of any number of pages within a single issue. Ordinarily, the cost of photographs will be charged to authors, but the rate is low. There is no extra cost for line drawings.

The editors reserve the right to adjust style (citation of references, italicizing names, etc.)to fit News standards of uniformity.

Address editorial correspondence to: Dr. C.L. Remington, Osborn Zoological Laboratory, Yale University, New Haven 11, Connecticut, U.S.A.

Address Society correspondence to: Dr. F.H. Rindge, Department of Insects and Spiders, American Museum of Natural History, New York 24, N.Y., U.S.A.

Address remittances to: Dr. J.B. Ziegler, 18 Baltusrol Place, Summit, New Jersey, U.S.A.

The Lepidopterists' News

Volume V 1951 Numbers 6-7

THE RESULTS OF A COLLECTING TRIP TO THE GASPÉ PENINSULA

by Douglas C. Ferguson, Nova Scotia Museum of Science, Halifax, Canada
and Laurence R. Rupert, Sardinia, New York, U.S.A.

So few lepidopterists have collected in the interior of the Gaspé Peninsula that the authors felt it would be worthwhile to record the results of a trip into Gaspesian Park made during July, 1950. Most maps indicate a road following the valley of the Cascapedia River north-ward to the mountainous area of the interior. After one rather unsuccessful night of collecting in the fertile lower valley near Cascapedia village, we decided to follow this river route northward as far as it would take us, and set out on July 13, after securing travel permits from the local forest ranger.

Station 2. Cascapedia Road

We drove nearly all day, gradually passing from the mixed coniferous and deciduous zone of the lower valley into pure Hudsonian spruce forest, as the terrain became more mountainous. After about 60 miles of travel we reached the beginning of an old trail (very hard to find) to the base of Mt. Albert. We hopefully camped there in our cars, thinking we might traverse the 2½ miles to the mountain's base the next day. The outer edge of a hairpin turn provided good parking space part way up a long, steep grade. Farther down the hill the road passed through a deep ravine, and from farther up we could look across a valley at the smooth, treeless summit of Mt. Albert. Even on that date several snow-filled ravines were visible on its western side. Our stopping place (Sta. 1) was around 1000 ft. elev., and the tree line was perhaps at 2500 ft. or lower.

At Sta. 1 the forest was composed almost entirely of tall, slender spruce trees, festooned with grey and green lichen that hung from the dead branches like Spanish moss. The forest floor was an unbroken carpet of green moss, with little undergrowth. There was some birch, and alder, and along the roadside an abundance of raspberry, Epilobium, and various low plants. The night was warm and dark, and our 4 gasoline lanterns brought good results. Sugaring was a complete failure.

The next morning, greeted by rain, we abandoned all hope of following the trail to the base of Mt. Albert and, afraid of a washout along the road, began the return journey. We paused for lunch near an abandoned mining camp and soon afterwards were overtaken by sunny skies. We stopped at a point (Sta. 2) eleven miles south of Sta. 1, and there spent the second night (see figure). The vegetation here was less alpine in character, with more birch, alder, and willow, a much greater variety of herbaceous plants, and less lichen than at Sta. 1. The spruce forest had moreunderbrush. The blackflies and mosquitoes were much worse, and gathered about us in swarms, dispersing only at nightfall. The fly-repellents we carried seemed to have little effect. The night of July 14 was cooler and moths were not so active.

The next morning we awoke shivering, and returned to civilization on a clear, cool day, stopping to collect butterflies here and there along the way.

ANNOTATED LIST OF SPECIES TAKEN

Papilio brevicauda gaspeensis McD. 1 fresh ♀ flying along a road, 21 mi. up the Cascapedia R., July 15.
Papilio glaucus canadensis R. J. Common all along the Valley of the Cascapedia, but most specimens rather worn. July 13-15.
Colias interior Scud. Gaspesian Park, July 15.
Pieris napi oleracea Harr. Quite common along the roadside, Valley of the Cascapedia, July 13, 15. Found as far up as Sta. 2.
Pieris rapae L. Cascapedia Rd., July 15.
Speyeria cybele, small race resembling novascotiae McD. Cascapedia Rd., July 15, 1 ♂.

Speyeria atlantis Edw. Cascapedia Rd., as far in as Sta. 2; a ♂ and ♀, both quite normal looking.
Boloria myrina atrocostalis Huard. Near the Federal Mines, Gaspesian Park, July 14, 2 ♂♂, 1 ♀.
Polygonia gracilis G. R. About 21 mi. up the Cascapedia R., 1 worn specimen flying along the road, July 15.
Limenitis arthemis Dru. Present in enormous numbers along the Cascapedia Rd. for perhaps 10 or 15 mi. beyond the village of Cascapedia, July 13. It seemed to be confined to the zone of deciduous trees in the lower part of the valley. On entering the zone of Hudsonian spruce forest farther on, we found that arthemis disappeared.
Plebeius saepiolus Bdv. Common in suitable places along the road as far up as Sta. 2, July 13-15. Their condition varied from worn to very fresh.
Carterocephalus palaemon Pall. About 10 mi. S. of Mt. Albert, July 14, one specimen.
Smerinthus jamaicensis geminatus Say. Cascapedia, July 12, a ♂.
Lexis bicolor Grt. Sta. 1, July 13, 2 specimens.
Parasemia parthenos Harr. A large Arctiid, presumably this, seen flying in the daytime near Sta. 2, July 14.
Alypia langtoni Couper. Near Sta. 2, one of each sex, July 14 (others seen).
Colocasia sp., probably propinquilinea Grt. Sta. 1, July 13. A melanic ♂.
Panthea acronyctoides Wlk. Sta. 1, July 13. 4 specimens, averaging rather dark.
Acronicta tritona Hbn. Sta. 2, July 14.
Acronicta fragilis Gn. Sta. 1, July 13.
Heptagrotis phyllophora Grt. Stations 1 and 2, July 13, 14.
Diarsia jucunda Grt. Sta. 2 (2).
Anomogyna sincera H.-S. Sta. 1 (2 ♂♂) and Sta. 2 (1 ♂), July 13, 14.
Anomogyna perquiritata Morr. Sta. 1, July 13, 2 ♂♂ at light; these differ slightly from Nova Scotian examples in genitalia, but are still closer to perquiritata than to speciosa.
Anaplectoides pressus Grt. Sta. 1, July 13, 1 ♀.
Polia latex Gn. Cascapedia, July 12. A worn ♀ at light.
Polia secedens Wlk. 5 specimens of this rare species came to light at Sta. 2, July 14.
Lacinipolia lorea Gn. Sta. 1, July 13.
Septis impulsa Gn. Sta. 2 (1).
Nycteola frigidana Wlk. 4 bred from larvae on willow at Sta. 2 emerged in the 2nd week of Aug.
Syngrapha microgamma montana Pack. A single specimen taken on a barren mountain slope, near the old Federal Mines, Gaspesian Park, July 14.
Lomanaltes eductalis Wlk. Sta. 1 (1).
Epizeuxis sp. that may be concisa Wlk. Sta. 1, July 13 (5).
Olene plagiata Wlk. Extremely abundant at Sta. 1. Also at Sta. 2, but scarcer. Over 30 taken.
Habrosyne scripta Gosse. Sta. 1 (1); Sta. 2 (many).
Drepana arcuata Wlk. Sta. 1, July 13.
Drepana bilineata Pack. Sta. 1, July 13.
Scopula quadrilineata Pack. Stations 1 and 2, July 13, 14.
Scopula frigidaria Moesch. Common at Sta. 2, July 14; flushed from the roadside herbage by day, and came in numbers to light. Over 20 taken.
Cosymbia pendulinaria Gn. Common at both Stations 1 and 2.
Lobophora nivigerata Wlk. Cascapedia, July 12 (1).
Neodezia albovittata Gn. Sta. 1, July 13 (2). Flying by day.
Calocalpe undulata Linn. Sta. 1, July 13. Flying by day. Bred from a larva on willow at Sta. 2.
Eupithecia castigata Hbn. Sta. 1 (5), Sta. 2 (2).
Eupithecia luteata Pack. Sta. 1 and 2, July 13, 14.
Eupithecia satyrata Hbn. Sta. 1, July 13 (2).
Eupithecia gibsonata Tayl. A Eupithecia larva on Arbor Vitae on the Gaspé coast, opposite Dalhousie, N.B., was probably this. It died of parasitism.
Eupithecia grata Tayl. Sta. 1, July 13 (1).
Eupithecia geminata Pack. Sta. 1, July 13 (1).
Eupithecia russeliata Swett. Common at both Stations 1 and 2.
Diactinia silaceata albolineata Pack. Sta. 1, July 13, 2 ♂♂, 1 ♀; Sta. 2, July 14, 2 ♂♂.
Dysstroma walkerata Pears. Sta. 1, 1 ♂, 1 ♀; Sta. 2, 1 ♂.
Dysstroma hersiliata cervinifascia Wlk. Cascapedia, July 12 (1).
Hydriomena renunciata Wlk. Very common at Sta. 1, July 13. Present also at Sta. 2, but less plentiful there. Large series taken. Also taken at Cascapedia, July 12.
Xanthorhoe luctuata obductata Moesch. Sta. 1, July 13, 10 specimens.
Xanthorhoe unangulata intermediata Gn. Sta. 2, July 14.
Xanthorhoe designata emendata Pears. Sta. 1, July 13.
Xanthorhoe ferrugata Clerk. Sta. 1, July 13, several, including form unidentaria Haw.
Xanthorhoe algidata Moesch. Common at Sta. 1, July 13 (over 30 taken). Not seen at Sta. 2.
Xanthorhoe iduata Gn. 6 specimens at Sta. 2. Not seen at Sta. 1.
Xanthorhoe abrasaria congregata Wlk. Sta. 2, July 14 (4).
Mesoleuca ruficillata Gn. Sta. 1, flying by day. Common.
Epirrhoe alternata Müller. Sta. 1 (1).
Eulype hastata gothicata Gn. Sta. 1, July 13 (8). Flying by day.
Eulype subhastata stygiata McD. Sta. 1, 2 specimens flying by day.
Venusia cambrica Curt. Very common at both Stations 1 and 2.
Hydrelia inornata Hlst. Cascapedia, July 12.
Hydrelia albifera Wlk. Sta. 2, July 14.
Semiothisa granitata Gn. Present at Stations 1 and 2.
Semiothisa orillata Wlk. Cascapedia, 2 at light, July 12.
Itame fulvaria Vill. Near Sta. 2, July 14. Netted in the daytime.
Paraphia piniata Pack. Sta. 1, July 13 (6).
Protoboarmia porcelaria indicataria Wlk. Sta. 1 and 2, July 13, 14; Cascapedia, July 12.
Anacamptodes larvaria Gn. At rest on a tree trunk near Cascapedia, July 13.
Campaea perlata Gn. Sta. 1, July 13.
Pero morrisonarius Hy. Edw. Cascapedia, July 12.
Caripeta divisata Wlk. Cascapedia, July 12.
Callizzia amorata Pack. Sta. 2, July 14.
Hepialus mustelinus Pack. Sta. 1, July 13, 1 ♂.
Undetermined Aegeriid, probably a species of Ramosia Engelhardt. Sta. 2, July 15, 1 ♂, taken when it landed on the road.

THE DE RABIÉ PAINTINGS OF LEPIDOPTERA IN THE BLACKER LIBRARY OF ZOOLOGY, MCGILL UNIVERSITY, WITH NOTES ON THE BUTTERFLIES REPRESENTED THEREIN

by E. G. Munroe
Systematic Entomology, Division of Entomology
Ottawa, Canada

The remarkable paintings of Hispaniolan natural history made by the engineer de Rabié in the years 1771 to 1784 have already been discussed in a paper by Wetmore (1930). Wetmore, however, described in detail only the paintings of birds, which were his special interest. He also summarized the salient features of the known history of the paintings, and for convenience some of this information may be repeated here.

De Rabié was of French nationality, and seems to have been employed for many years as a government engineer in the Northern Department of Haiti, then a French possession. He is known to have prepared plans for a structure built in Haiti as early as 1752, and he was painting birds of the island as late as 1784. He died in Paris in 1785. His interest in natural history began about 1771. He appears to have had no knowledge of Linnaean nomenclature, but instead used vernacular names, some of which are apt and even picturesque.

The paintings themselves are done in water colour on paper which, although rough, is of good quality. In almost all cases the subjects are depicted at about their natural size. In the butterflies, as in the birds, virtually all the species whose provenance can be ascertained from internal evidence are clearly of Hispaniolan origin, and I think that Wetmore is right in considering these paintings as definite early Hispaniolan records of the species concerned. Some of the paintings bear the inscription "au Cap", which no doubt means Cap Haitien.

The paintings are on sheets of various sizes, some bearing one, but the majority more than one, figure. They have been mounted where necessary on larger sheets, and have been bound into four volumes, of which the one that interests us is titled "Insectes et Coquilles". "Insectes" is taken in a broad sense to comprise arthropods of many kinds, including even some marine Crustacea. A large proportion of the insects represented are Lepidoptera. Thirty-four species of butterflies are shown; these are listed below. There are figures of early stages of six of these species.

The paintings of adults are detailed and remarkably accurate for the period. Even subspecific characters are almost always unmistakably shown. Under as well as upper sides are figured in a number of cases. The paintings of larvae are inferior in quality to those of the adults, but usually give a good impression of the general appearance. What are no doubt food plants are also figured. I do not venture to identify these, but I reproduce de Rabié's vernacular names, which are in some instances self-explanatory.

The species figured are all represented in the existing fauna. It is noteworthy, however, that several of them are now very rare. In only two species is there any suggestion that the population of the 18th Century differed from that of the present day. In each of these the specimen figured shows characters suggestive of the existing population of a neighbouring island.

HESPERIIDAE

1. Perichares phocion phocion (F.); "la nuit". The larva is figured as green, with a double yellow longitudinal stripe; it is on a grass identified as "herbe de Guinée".
2. Phemiades antiqua (H.-S.); "le léopard".
3. Hylephila phyleus (Dru.); also as "le léopard", but on a different plate from the preceding.
4. Urbanus dorantes cramptoni Comst.; "l'hirondelle".
5. Urbanus proteus (L.); "le bacha".
6. Phocides pigmalion pyres (G. and S.); "le timpan". This insect is now rare.

PAPILIONIDAE

7. Graphium zonaria (Butl.); "le busque". This species is very rare at the present time.
8. Battus polydamas polycrates (Hopf.); "le chapelet". The under side is figured, and shows the characteristic markings of the subspecies, except that the marginal lunules of the hind wing are represented as being separated from the margin.

PIERIDAE

9. Appias drusilla boydi Comst.; "Pierrot". A male is figured, plain white, without markings above or below.
10. Ascia monuste (L.); "le brunet". The specimen is pale below, with extensive but rather indefinite brown markings. In Comstock's (1943) arrangement it would be referable to A. monuste monuste.
11. Eurema elathea (Cr.); "la commette". A male is figured, without dark dusting beneath.
12. Eurema proterpia proterpia (F.); "l'anguleux". The specimen is of the dry form (gundlachia Poey), with strongly angulate hind wings and the veins not lined with black. The outer margin is not black bordered, although the costal margin is.
13. Eurema sp.; "le point du jour". I was unable to identify this figure. The general appearance is that of a male of E. lisa (Bdv. & Lec.). The fore wing has no discal dot, however, and there are no rusty markings on the under surface of the hind wing.
14. Phoebis statira hispaniolae Munr.; "le moucheté". A female of what appears to be this

butterfly is illustrated. It differs from the only female specimen of the subspecies I have seen - the allotype - in that the ground colour is orange-buff instead of pale yellow. The Hispaniolan subspecies is now rare.

15. Phoebis orbis browni Munr.; "le fardé". A male, with the expected characters of the subspecies. The species is rare.
16. Phoebis thalestris (Ill.); also as "le fardé", but not on the same plate as P. orbis. A male is figured.
17. Phoebis sennae sennae (L.); "le paillet d'or". A male, with very weak brown markings beneath.

NYMPHALIDAE

18. Anetia pantherata pantherata (Mart.); "le tigre". I follow the nomenclature of d'Almeida (1939).
19. Lycorea ceres cleobaea (Latr.); "le noeud de ruban". The larva is figured on "papayer". It is closely similar to that figured by d'Almeida (1939, Pl. 30) for L. ceres ceres (Cr.). The head and anal segment are black, the thoracic and subanal segments white, and the remaining segments yellow. Each of the pale segments has a black, anterior, transverse band and a black, oblique, lateral patch. The prolegs are black, and there is a long pair of mesothoracic filaments. The pupa is yellowish green, with a number of black spots.
20. Danaus plexippus portoricensis Clark; "le manteau ducal". The specimen figured approaches very closely normal examples of the existing population of Puerto Rico. The fore wing is short, with the outer margin relatively erect; the submarginal spots of the hind wing are obsolete, and the veins on the under side lack white edging; the subapical spots of the fore wing above are white, but the more basal pair is fully developed, not lacking as in typical portoricensis. It is interesting, though perhaps not very significant, that the specimen resembles those now found in Puerto Rico more closely than do most Hispaniolan individuals of the present day. The larva and pupa are recognizably figured.
21. Siderone nemesis nemesis (Ill.); "la furie".
22. Anaea troglodyta troglodyta (F.); "le mor doré", and "la pertuisane" (on different plates). The specimen has the expected characters of the Hispaniolan subspecies.
23. Marpesia chiron (F.); "le corcet".
24. Historia acheronta cadmus (Cr.); "le quint".
25. Colobura dirce wolcotti Comst.; "la pleureuse". The larva is figured on "bois trompette". It is black, with white tubercles on the body and a pair of black, white-tipped tubercles on the head. The pupa is suspended by the cremaster, and is gray-brown and stick-like, with leaf-like dorsal flaps on the abdomen.
26. Myscelia antholia (Gdt.); "la nuit". A splendid specimen, with the characteristic large patches. The species is now excessively rare. De Rabié can hardly have confused it with Perichares phocion, to which he applied the same vernacular name.
27. Hypolimnas misippus misippus (L.); "le superbe". The specimen is a male. The early record from the Western Hemisphere is interesting, although Linnaeus described the species from "America" in 1764. As is well known, the American population belongs to the African subspecies, and was without doubt introduced by human agency in historic times.
28. Metamorpha stelenes stelenes (L.); "le verd d'eau". The larva is figured on "herbe à petard". It is shown as being black, with four rows of branched purple spines on the body, and on the head a pair of long black spines which bear purple branches. To judge from the description by Wolcott (1923), de Rabié's figure of the larva is inadequate. The pupa is depicted as being flattened and somewhat Apatura-like. The head is bifid and the thorax bears a low mid-dorsal cone; the abdomen is expanded dorso-ventrally, and bears two slender, black, mid-dorsal spines, one behind the other on the highest part.
29. Anartia lytrea lytrea (Latr.); "la fraise". The specimen belongs to the large, pale subspecies that is characteristic of Hispaniola.
30. Junonia evarete zonalis (Fldr.); "le petit oculé".
31. Euptoieta hegesia ?hegesia (Cr.); "la musique". The specimen figured is of considerable interest, as the markings in the cell of the fore wing, although faint, definitely consist of transverse bands extending from radius to cubitus. This character would place the specimen in the subspecies hegesia, which is now confined to Cuba and Jamaica; hegesia is replaced in Hispaniola by the subspecies watsoni Comstock, which also occurs in Puerto Rico. The present distribution pattern is a little anomalous, and, although we cannot rule out the possibility that the specimen figured by de Rabié was aberrant, or that his draughtsmanship was faulty, it is nonetheless tempting to speculate that the subspecies hegesia has been replaced in Hispaniola by the subspecies watsoni in very recent times, presumably by invasion from Puerto Rico. This hypothesis receives some support from the fact, noted by Comstock (1944), that the present Hispaniolan population shows traces of contamination with hegesia elements, as compared with topotypical watsoni from Puerto Rico.
32. Dione vanillae insularis (Mayn.); "le nacré". The well known larva is figured on "pomme de liane".
33. Dryas iulia hispaniola Hall; "le rocon". The figure is of a male, exactly similar to those now found on the island.
34. Heliconius charitonius churchi Comst.; "le quint rayé". The revision by Comstock and Brown (1950) had not appeared when I examined de Rabié's figure, and I could not, therefore, compare it with their characterization of the existing Hispaniolan population. I noted only that the figure showed extremely broad yellow bands.

OTHER INSECTS

In addition to the butterflies, enumerated above, there are paintings of a considerable number of moths. Unfortunately, I was not equipped to

identify these. The Sphingidae are well represented, with species of at least seven genera; the life histories of several species are illustrated. There are also some noctuids, mostly of the more showy species, and a few syntomids, arctiids, and geometrids. In addition to the Lepidoptera, there are various Coleoptera, Hymenoptera, Orthoptera, and Diptera, again with some life histories, and a few Arachnida, myriapods, and Crustacea.

ACKNOWLEDGMENT

I wish to thank the Librarian of McGill University for giving me permission to publish this short account of an interesting and unique set of paintings.

This is Contribution No.2797, Div. of Entomology, Science Service, Dept. of Agriculture, Ottawa, Canada; the author is Agricultural Research Officer.

REFERENCES

d'Almeida, R. F. 1939. "Revisão das especies americanas da superfamilia Danaoidea (Lepid.: Rhop.). Parte 1." Mem. Inst. Osw. Cruz, vol. 34: pp.1-113, 30 pls.

Comstock, W. P. 1943. "The genus Ascia in the Antilles (Lepidoptera, Pieridae)." Amer. Mus. Novit., no.1229: pp.1-7.

_____ 1944. "Insects of Porto Rico and the Virgin Islands. Lepidoptera (Suborder) Rhopalocera." N.Y. Acad. Sci., Sci. Surv. Porto Rico and Virgin Is., vol.12: pp.421-622, 12 pls.

_____,& F. M. Brown. 1950. "Geographical variation and subspeciation in Heliconius charitonius Linnaeus (Lepidoptera, Nymphalidae)." Amer. Mus. Novit., no.1467: pp. 1-21.

Linnaeus, C. 1764. Museum Ludovicae Ulricae Reginae etc., "Lepidoptera." Stockholm.

Wetmore, A. 1930. "The Rabié paintings of Hispaniolan birds." The Auk, vol.47: pp.481-486.

Wolcott, G. N. 1923. "Insectae portoricensis." Journ. Dept. Agr. Porto Rico, vol.7: pp.1-113.

WALTER RICHARD SWEADNER

The investigation of the biology of interspecific hybridization has long been one of the most pressing needs in the field of evolutionary theory. Much of the literature on such hybridization is in the form of scattered, brief notes. Two of the most important of the few sustained studies are by lepidopterists. Prof. Federley's now classic series of papers on the chromosomal behavior in crosses between species of "Pygaera" and other moths have had a great influence. Dr. Walter R. Sweadner produced another notable analysis, his report on field studies of hybridization in the large Nearctic saturniid moths of the genus Platysamia (= Hyalophora, in part). He carried hundreds of cocoons, primarily of P. cecropia (Linné), into the western areas occupied by several other Platysamia, allowed virgin cecropia females to lure wild males, and studied the offspring resulting from subsequent intermatings.

Although interested in Lepidoptera as a young man, Sweadner studied electrical engineering in college and received a B.S. degree in that subject in 1927 from the Carnegie Institute of Technology in Pittsburgh, Pennsylvania. However, during his college years his proximity to the Carnegie Museum and its very large Lepidoptera collections doubtless led to the stimulation of his entomological interests. He enrolled as a graduate student in the Department of Zoology of the University of Pittsburgh and received his M.S. degree in 1931 and his Ph.D. in 1934. From 1929 to 1934 he served as Assistant in Zoology and in 1934 and 1935 as Lecturer. From 1935 to 1941 he held the appointment of Instructor at the Erie Branch of the University. At one time he was Visiting Professor at Thiel College. From 1941 until his death he was Assistant Professor of Zoology at the University of Pittsburgh.

From 1930 to 1941 Sweadner had frequently worked on the insect collection at the Carnegie Museum as a volunteer worker. Since his college days he had

known Andrey Avinoff (see Shoumatoff, Lep. News, vol.4: pp.7-9; 1950). Dr. Avinoff was appointed Director of the Museum the year before Sweadner's graduation from college. During Avinoff's directorship, on 1 March 1941, Dr. Sweadner was appointed Assistant Curator of Entomology. The next year he was promoted to the Curatorship. He was faced with the heavy task of organizing and arranging the Lepidoptera collection, which had been left in a chaotic state by its principal assembler, W. J. Holland (see J. E. Remington, Lep. News, vol.1: p. 98; 1947). Dr. Sweadner has described the extent and areas of emphasis in the collection in the Lep. News, vol.2: p.80; 1948. By 1948 he had largely completed the work of organization. He had also sought out and marked clearly the individual specimens used by Holland in preparing the plates of The Butterfly Book, a service of importance in solving many future nomenclature questions. Shortly before his death, he had offered to prepare for the Lep. News a list of the species figured, with the precise data on the label of each, and of course his offer was gladly accepted. Apparently he had no opportunity to begin the list.

Aside from the Platysamia research, Sweadner's major publication was a revision of the Karanasa butterflies, which he wrote with Dr. Avinoff. He had to finish it alone after the death of Dr. Avinoff in 1949, and it was not published until twenty-eight days after his own untimely death. The Memorial Note in the Karanasa monograph includes the following tribute: "Dr. Sweadner surmounted limitations of time and strength to re-study Karanasa in the light of final acquisitions, to prepare the manuscript and to see it through the press. He actually read final proofs on the very eve of a major [surgical] operation, an admirable instance of scientific devotion at a time of great physical stress and mental travail. He recovered sufficiently to approve everything except the introductory material and the final color proof of Plate 11, only to succumb unexpectedly from post-operative complications on January 13, 1951."

From time to time Sweadner worked on problems of medical entomology. As a graduate student he was a research employee of the Mercy Hospital in Pittsburgh (1930-32) and experimented with the therapeutic use of fly maggots in cleaning up certain infections (see bibliography, below). In 1944 he directed investigations of the role of insects in the poliomyelitis epidemic in the Pittsburgh area. His own tragically early death followed a major operation necessitated by another dreaded disease.

Sweadner was born on 11 August 1903 at Beaver, Pennsylvania, the son of Robert W. and Kathaleen (Campbell) Sweadner. He was said to be in the tenth generation born in the territory of the present U.S.A. He was married in 1941 and is survived by his wife, Marie W. Sweadner, and two small children.

Dr. Sweadner was a Charter and Sustaining Member of The Lepidopterists' Society. He was a member of the Nominating Committeewhich selected the first officers of the Society, and championed particularly the nomination of several non-professional members. He was also a member of the Pennsylvania Academy of Science, the Society of Sigma Xi (for research scientists), and the Society of Systematic Zoology.

Sweadner was a keen collector and a clever field man. He found the enigmatic Sphinx francki Neum. in a new locality. He made a film showing the mating of Heliconius charitonius (Linné) in Florida before the female made her first flight. But he wrote only a few papers for publication, as the list below shows. Friends believe he was just entering his period of regular productivity with the publication of the Karanasa monograph. His loss is poignantly felt by a very large number of lepidopterists who knew him personally or by correspondence.

I wish to thank Dr. George Wallace, Sweadner's successor as Curator, for providing me with many of the detailed data and for arranging the loan of the portrait.

C. L. Remington

BIBLIOGRAPHY OF W. R. SWEADNER

1. 1933 (with G. C. Weil and R. J. Simon), "Biological, bacteriological, and clinical study of larval or maggot therapy in the Treatment of Acute and Chronic Pyogenic infections." Amer. Journ. Surgery, vol.19: pp.36-48.

2. 1937. "Hybridization and the Phylogeny of the genus Platysamia." Annals Carnegie Museum, vol.25: pp.163-242, pls.15-20.

3. 1942. "Butterflies and moths. The rich collection at the Carnegie Museum." Carnegie Mag., vol. 15: pp.227-230.

4. 1942. "Three miles up." Carnegie Mag., vol.16: pp.163-167.

5. 1944 (with W. H. Robinson), "Report on poliomyelitis in Allegheny County, 1944." Prepared for the Special Committee on Poliomyelitis of the Allegheny County Medical Society. 5 pp.

6. 1946. "Bug-hunting between battles." Carnegie Mag., vol.20: pp.117-118.

7. 1947. "Exaggeration for effect." Carnegie Mag., vol.20: pp.206-208.

8. 1948. "Lepidoptera in the Carnegie Museum." Lep. News, vol.2: p.80.

9. 1948. "Rock, glass and butterflies." Carnegie Mag., vol.22: pp.131-133.

10. 1949. "The female of the species is more deadly than the male." Carnegie Mag., vol.23: pp.52-53.

11. 1951. (with A. Avinoff), "The Karanasa butterflies, a study in evolution." Annals Carnegie Museum, vol.32: pp.1-218, pls.1-17.

A DRAFT KEY TO EPIMECIS (GEOMETRIDAE)

William T. M. Forbes
Cornell University
Ithaca, New York

The genus Epimecis Hübner (Bronchelia Guenée) contains the largest of American geometers. While there are not very many species, they are generally somewhat confused in collections, and the following key, though neither critical nor complete, should be of some help in sorting material. It is planned for the males, but will normally apply to females, if one remembers that in this genus they are larger, usually a little more evenly colored, and tend to have much weaker dark marginal markings below. It is based mainly on material in the U.S. National Museum and the Cornell collection.

1. Hind wing angled, the two scallops between M_1 and M_3 being large, deep, and in line with each other; under side deep orange buff . . . . . jamaicaria Oberthür

-- Hind wing rounded, all the scallops being rather similar; under side rarely (plumbilinea) bright yellowish 2

2. Male with ground white and an apical black patch beneath which extends solidly in to the pm.* line (which is far out) but not below M_3; pm. line double, dark, and pale-filled on costal half, but single, dark, and scalloped on inner half; female also pure white, with the st.* shade absent, or represented by a shade along upper half of pm. line 3

-- No such apical black patch in male, or the patch with a strong extension below M_3; ground hardly ever pure white 5

3. Apical area below solid black or with very limited marginal white in male, solid white in female; smaller species 4

-- Terminal area below contrasting whitish in both sexes, the black (♂) or blackish (♀) almost limited to the subterminal area; larger species . . . . . anonaria Felder

4. Markings heavy and lines broad in both sexes, the two elements of the pm. on hind wing wider than the white space between them . . . . . curvilinea Warren

-- Markings light in both sexes, the two elements of pm. line light and separated by much more than their width . . . . . puellaria Guenée

5. Subapical black area cut off abruptly above M_3, with at most a small separate spot in cell Cu_1; a small white species . . . . . detexta Walker

-- Dark marginal or submarginal shade below when present extending uninterrupted below M_3 . . 6

6. Black outer area extending in to the pm. line, which is far out 7

-- Black or dark shade when present not nearly reaching in to pm. line, which is far in on costal half of fore wing 9

7. Under side lemon (♂) or pale yellow (♀); the whitish apical spot and terminal spot in cell M_3 contrasting on upper as well as under side . . . . . nasica Draudt

-- Without the two conspicuous pale spots on fore wing; under side never yellow, rarely tawny . 8

8. Upper side brown in male, with a very broad brown st. zone in female; dark shade below diffuse, broad in front, with more or less distinct pale subterminal dots near its outer edge . . . . . vexillata

-- Upper side umber on a cream ground, under side white, with a narrower, blacker and more defined dark st. band, with more distinct pale st. dots near its outer edge . . diffundaria Walker

9. Under side ochre, and upper side with ochre tint; a st. gray patch of special scaling extending from middle of cell M_2 to bottom of cell M_3; larger on both wings in male, in female smaller on fore wing only . . . . . plumbilinea Warren

-- Under side dark gray, almost evenly, upper side also blackish 10

-- Under side light with darker shading, or almost evenly white; no special scaling 11

10. North American . . . . . hortaria, form carbonaria Haimbach

-- South American . . . . . conjugaria (?), f. fumaria Schaus

11. Pm. line pale in a dark shade, or double, dark, and somewhat diffuse, with pale filling . . 12

-- Both pm. and st. lines similar, wavy, and pale with double gray shading, the pm. short; a dark species with luteous under side (Jamaica) . . . . . scolopacea Drury

---

* "pm." = postmedian; "st." = subterminal.

-- Pm. line below when distinct fine, dark, and single or with a much weaker second line; waved or scalloped 14

12. Ground above brownish; under side with a continuous dark submarginal band 13

-- Upper side marked with dark gray on dirty white; submarginal marking on under side black, leaving a large white patch in cell M_3 and reaching the margin above it . . . . . conjugaria Guenée

13. Slightly smaller; under side of fore wing usually with a small fragment of a pale wavy st. line toward costa, projected on the blackish st. stripe . . . . . matronaria Guenée

-- Slightly larger, browner, yellower below; st. usually represented by a fairly complete series of pale dots in the outer edge of the blackish shade . . . . . fraternaria Guenée

14. Under side of fore wing with a broad dark shade below, reaching the margin and leaving only small scattered white marginal spots 15

-- Dark shade below much narrower, purely subterminal, with a continuous pale marginal zone . 16

15. Ground above darker and browner, st. shade below sharply defined, leaving small pale marginal areas . . . . . subalbida Warren

-- Ground above paler and grayer, the st. shade below diffuse on fore wing, gradually paling to margin, on hind wing leaving almost continuous white spots . . . . . .fumistrota Warren

16. Subterminal shade almost absent below, but ground above decidedly luteous . marcida Warren

-- St. shade well developed below 17

17. Ground above practically white, the terminal darkening conspicuous in male in the form of a narrow and well marked bend on both wings . . . . . pudicaria (of Nat. Mus.)*

-- Ground above luteous, heavily dark-dusted . . 18

18. Smaller, more luteous, the subterminal shade on the fore wing below weaker, though usually well marked, with the series of pale st. spots near its outer edge 19

-- Larger and more fuscous above; st. shade below conspicuous on both wings, dark and even . . . . . patronaria Walker

19. Darker, the ground more contrasty, the discal dot of hind wing usually strong; North American . . . . . .hortaria J. E. Smith

-- Paler and more evenly marked, sex for sex; the discal dot on hind wing normally obsolete; South American . . . . . repressa Prout

---

* The type of pudicaria Guenée, as figured by Oberthür, Études de Lépidoptèrologie Comparée, fig. 1716, looks more like what should be the proper female of marcida; pale luteous above and nearly immaculate below.

NOTICES OF BOOKS AND SPECIAL PUBLICATIONS IN PRINT

LARVAL FOODPLANTS. A VADE-MECUM FOR THE FIELD LEPIDOPTERIST. By P.B.M. Allan. London, 1949. 126 pp. Available bound from the publisher: Watkins and Doncaster, 36 Strand, London W.C. 2, England.

The problem of acceptable foodplants is a common one to every rearer of Lepidoptera and an important one to an investigator of the speciation and adaptation of phytophagous insects. Mr. Allan has compiled for the British macro-Lepidoptera a list of the known plants on which each species may be reared successfully from egg to pupa; thus he omits plants on which females occasionally oviposit by mistake or on which larvae will feed at first but be unable to complete development. This little book is essential to British workers, valuable to any collector in the Palearctic region, and useful even in North America in providing leads by which unknown foodplants of related Lepidoptera may be guessed.

LES LÉPIDOPTÈRES. By Jean Bourgogne. La Nature, no. 3194: pp.175-181, 4 pls. (2 col.), 13 figs, and cover. 1951. Subscription 1500 fr. or $5.50 per year, publ. by Masson et Co., Paris 6e., France.

M. Bourgogne has summarized in few words several of the most interesting aspects of the life of Lepidoptera, in part a condensation of his fine review of Lepidoptera in the new Traité de Zoologie. This article is beautifully illustrated by photographs by Le Charles and Vanden Eeckhoudt, by drawings, and by two colored plates from the Traité. La Nature is a semi-technical review of the sciences.

AN ANNOTATED LIST OF THE LEPIDOPTERA OF ALBERTA. By Kenneth Bowman. Canadian Journ. Zool., vol.29: pp. 121-165. 1951.

This is a tersely annotated check-list of all

NOTICES OF BOOKS AND SPECIAL PUBLICATIONS IN PRINT - cont.

the Lepidoptera known to Mr. Bowman from Alberta. It is a pleasure to find a faunistic study in which an attempt is made to deal with the entire Order, instead of the butterflies alone. There is an extensive introduction by E.H. Strickland in which the vegetation, soil, and rainfall are described for each of 21 "Ecological Areas" of Alberta from which collections came. The checklist gives, for each species, key numbers referring to one or more of the 21 areas instead of giving specific locality names for each species. The months of known flight are indicated by roman numerals. The nomenclature has in general been treated meticulously, with decisions to accept recent changes like Boloria, Ramosia, and Vitacea, but interestingly, to reject others like Speyeria, Limenitis, Proteides clarus, Antheraea polyphemus, and Hyalophora cecropia. The subspecies treatment appears to be muddled. Presumably flying together, we find two subspecies of: Papilio machaon, Colias pelidne, Pieris occidentalis, Argynnis cybele, A. atlantis (three!), A. callippe, A. mormonia, Nymphalis milberti, Hesperia comma, and so on. Immigration might make one or two valid, but not so many. Further confusion comes from failure to discriminate between subspecies and mere forms; there is complete chaos under Colias eurytheme. Something like 1500 species are reported for Alberta, about 40% being Microlepidoptera; over 130 are butterflies.

LE MIMÉTISME. By Lucien Chopard. 335 pp., 100 text figs. 1949. Payot, 106 Boulevard St.-Germain, Paris.

The title of this book is misleading to one accustomed to the restricted use of the term "Mimicry"; in the latter sense it is a special type of adaptive coloration based usually on the distastefulness of a potential prey species and the resemblances which arise in the course of evolution allowing another species to share the immunity of the distasteful or otherwise protected species by resembling its color and pattern. In fact, this is a summary of the whole subject of adaptive coloration in animals, and lepidopterists may regret that only three of the eleven chapters are devoted to "Le Mimétisme". M. Chopard is Sous-Directeur of the Paris Museum, and a noted Orthopterist. He points out in his preface that the 1940 monograph by Hugh B. Cott (Adaptive Coloration in Animals, Methuen and Co., London) is the prime review of information on its subject. He adds that he regards Natural Selection as a powerful factor in evolution, but, unlike Cott, he believes that it does not explain everything. And this theme pervades the whole book. It is unfortunate that very many small inaccuracies and several misconceptions have been allowed to appear in the pages. One is surprised to find the school of "sélectionnistes néo-darwiniens" characterized as English, when many of its most influential members are now Americans (Dobzhansky, Simpson, Wright, Mayr, et al) and the school of "mutationistes" labeled as American (examples given are Goldschmidt -- a German most of his life, A.F. Shull -- whose present influence is probably slight, and R.C. Punnett -- an Englishman)! This is not the clean, precise work which the subject demands, and yet the problems of adaptive coloration are generally well set forth for the French lay reader for whom it was presumably intended.

BULLETIN BRITISH MUSEUM (NATURAL HISTORY), ENTOMOLOGY.
"A Revision of the Family Ceracidae". By A. Diakonoff. Vol.1: pp.171-219, 34 figs. 1950.
"The Type Specimens of Certain Oriental Eucosmidae and Carposinidae". By A. Diakonoff. Vol.1: pp.273-300, pls.3-8, 2 figs. 1950.

These two papers by Dr. Diakonoff comprise No.2 and No.4 of an attractively printed new series, of which an editorial note states: "Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year." The price of the Ceracidae revision is 10 shillings, that of the other paper is 8 shillings. Both are well illustrated.

Dr. Diakonoff regards the Ceracidae as very distinct from the other five families of Tortricoidea (Melanolophidae, Phaloniidae, Eucosmidae, Chlidanotidae, Tortricidae) and gives a key for separating the six tortricoid families. He characterizes the Ceracidae in detail and gives a key to the 4 genera and to the species of each. They occur from India to northern Japan and far eastward into the East Indies. No larvae and pupae are known in structural detail.

The other Bulletin deals primarily with fixing lectotypes of Meyrick's Oriental Eucosmidae and Carposinidae; Dr. Diakonoff also erects ten new species. Many of Meyrick's species are sunk as synonyms.

ECOLOGICAL AND SYSTEMATIC STUDY OF THE HESPERIOIDEA OF TEXAS. By H.A. Freeman. Southern Methodist Univ. Studies, no.6: 67 pp. 1951. Available from: Southern Methodist University Press, Dallas, Texas; paper cover, $1.50.

The author doubtless is better acquainted with Texan skippers in the field than any previous collector. The present paper gives his notes on habits and "flower preferences" for most of the 144 species reported from Texas and is a useful contribution to the natural history of the Hesperioidea. The flower "preferences" actually appear to be simply lists of flowers (very many cultivated) on which each species has been found, and are not based on detailed studies of PREFERENCES. There are keys to genera and, often, species, with brief descriptions. Precise Texan localities and dates are given for each species. No illustrations are included, and there are no synonymies or taxonomic additions or changes. No attention has been directed to the foodplants of larvae other than Megathymus.

BUTTERFLIES OF GRAND CANYON NATIONAL PARK. By John S. Garth. Grand Canyon Nat. Hist. Assoc., Bull.11: 52 pp., 25 figs., cover in col., map. 1950. Available from the Association, P.O. Box 219, Grand Canyon, Ariz., in paper cover, $0.75.

This is a briefly annotated list of the butterflies known from the Park. It is illustrated by 25 excellent original black-and-white photographs and a good colored photo on the cover. There are no other aids to identification. The list is based on very few records.

DE DANSKE SPINDERE. By Skat Hoffmeyer. 198 pp., 23 col. pls., many text figs. 1948. Universitets forlaget, Aarhus, Denmark.

The author points out that the "Spindere" are not phylogenetically a unit. The families dealt with in this volume are certainly a heterogeneous lot: Sphingidae, Notodontidae, Drepanidae, Cymatophoridae (= Thyatiridae), Thamatopoeidae, Lymantriidae, Lasiocampidae, Endromididae, Saturniidae, Arctiidae (s.l.), Zygaenidae, Aegeriidae, Psychidae, Limacodidae, Cossidae, and Hepialidae. All of the Danish species are included. The colored plates are good and depict the upperside of the adults of all the species and the larvae of many. Some ova, larvae, pupae, and aberrations are shown in the text figures. Unfortunately, I cannot read thoroughly the Danish text, but in general it appears to discuss the habits, flight seasons, Danish distribution, larval habits and foodplants, and aberrations or other color forms. It appears to be an excellent guide to Danish Lepidoptera, in combination with other volumes to follow.

DE DANSKE UGLER. By Skat Hoffmeyer. 347 pp., 32 col. pls., sev. text figures. 1949.

This volume has the same plan as the "Spindere" volume but deals with the single family Noctuidae. All species are figured in color (adults) and in addition there are larvae of 204 species! The text figures are largely of aberrations and ♂ genitalia.

CURSO DE ENTOMOLOGIA. III. MORFOLOGIA INTERNA. By Eduardo del Ponte. Published by the Museo Argentino de Ciencias Naturales in Buenos Aires, Argentina. Pp.103-161, figs.44-88, 1 pl. 1950.

This is another in the Curso series which is intended to provide a good textbook of entomology written in Spanish (see Lep. News, vol.4: p.68 for a notice of parts I, II, IV, V). The present part, on internal anatomy of insects, summarizes the present textbook knowledge of the several organ systems. It is illustrated by a large number of figures redrawn from a few authors, primarily Snodgrass. It maintains the sound standard of the four earlier parts.

MOTÝLI DENNÍ. By Rudolf Schwarz. Vol.1: 14 + XLII pp., 48 col. pls.; 1948. Vol.2: 10 + LXIX pp., 48 col. pls.; 1949. Available bound from the publishers: Vesmír, Nakladatelská a Vydavetelská, Spol. S R.O., Praha VII, Dobrovské ho 27, Czechoslovakia, or perhaps better through personal arrangement with a member of the Lep. Society living in Czechoslovakia.

The two small volumes introduce a series planned to cover the Lepidoptera of Central Europe. These deal with the butterflies, volume 1 including the Papilionidae, Pieridae, and Satyridae and volume 2 the Nymphalidae, Riodinidae, Lycaenidae, and Hesperiidae. The rather brief text is in Czech and therefore of little use to most lepidopterists, but the 96 colored plates are very good and every species is referred to by its latin name. The plates figure for most species: the adults of both sexes, the larva, and the foodplant; some pupae are also shown. The third volume containing the Sphingidae and Aegeriidae was due to be published in 1951, but we have not yet received it.

LÉPIDOPTÈRES HOMONEURES. By Pierre Viette. Faune de France, vol.49: 83 pp., 73 figs. 1948. Available from: Paul LeChevalier, 12 rue de Tournon, Paris VI^{e}, France, for 550 francs.

This slim volume is a monographic summary of high quality. About one-third of the pages form an introduction to the Order Lepidoptera, with well illustrated discussions of the aspects of the morphology, life history, and systematics relating to classification of the Lepidoptera, and brief collecting, preserving, and mounting instructions.

There is a key to the major groups of Lepidoptera, with the following classification:

Suborder Homoneura
- Micropterygoidea
- Hepialoidea

Suborder Heteroneura
- Monotrysia
  - Stigmelloidea
  - Incurvarioidea
- Ditrysia
  - Hesperioidea
  - Papilionoidea
  - Bombyces
  - Geometres
  - Noctuelles
  - Sphingidae
  - Cramboidea
  - Cossoidea
  - Psychoidea
  - Tortricoidea
  - Tineides

The body of the work deals with the French representatives of the Homoneura (Micropterygidae, Eriocraniidae, Hepialidae). M. Viette gives for each species full references and descriptions of the wings, genitalia, the larva if known, the habits, and the distribution. There is a good number of clear figures. France has 13 species (1 genus) of Micropterygidae, 7 species (3 genera) of Eriocraniidae, and 9 species (3 genera) of Hepialidae. A few points of unusual habits are worth repeating here. The adults of two Micropteryx come regularly in large numbers to the flowers of Caltha. The females of Hepialus humuli and hecta fly in search of the males, whereas the reverse is found in Korscheltellus, as in nearly all Lepidoptera. In the Pyrenees there is a hepialid (K. pyrenaicus) with flightless, stubby-winged females.

OPERATION SATURNID. By John P. Duane and John E. Tyler. Interchemical Review (house organ of Interchemical Corp.), vol.9: pp.25-28. 1950.

This widely publicized paper purports to announce data indicating that the female "Samia" cecropia attracts potential mates by emitting infra-red radiation within a certain wave-length corresponding to the length of the hairs on the antennae of the male cecropia. Even granting that a few psychologists believe olfaction to be based on infra-red perception, a reader can hardly consider the data of this article as giving a significant indication of an infra-red mechanism for sexual attraction. The writers were apparently unaware of the voluminous literature on sexual attraction or of the progress in identifying the attractant (which is NOT produced in the thorax!).

BUTTERFLY COLLECTING IN COLORADO

by F. Martin Brown
Colorado Springs, Colorado

Each year I receive letters from naturalists who plan to spend some time in Colorado, each writer asking for advice in planning his trip. Bearing in mind this interest, I have assembled what I know of the opportunities in Colorado. The best maps -- other than the regular auto route maps -- are the Sectional Aeronautical charts (Cheyenne, Denver, and Trinidad cover all but the westernmost 65 miles).

Colorado is spectacular in its variety. The eastern third is High Plains, semi-arid and grass-covered except where irrigation has allowed agricultural development in the broad river valleys. The northern half is more developed, more moist, and more accessible than the southern half. The middle third is mountainous, and forested ranges alternate with grassy parks. Main roads are good and accommodations plentiful along them. Secondary roads are poor and accommodations all but non-existent. The western third is a high plateau deeply dissected by canyons. The highlands sustain a good forest; the lowlands are covered with sagebrush. The altitude ranges from 3386 feet above sea level on the eastern border to 14,402 feet at the top of Mt. Elbert. Elevations up to 14,000 feet are reached by automobile (Pikes Peak and Mt. Evans, both in the Front Range). Many highways cross the mountains at or near tree-line (in Colorado about 11,800 feet). Four great river systems have their origins in the state, the Colorado, the Rio Grande, the Arkansas, and the Platte. Five life-zones are represented by large areas.

Collecting on the eastern plains starts in early April and peters out by the end of June, although there are some purely summer things that make a stop or two worthwhile while crossing the plains. Collecting between 6500 feet and 8500 feet is best from mid-May to the end of June. The month of June is the best time between 8500 and 10,000 feet although lately this area continues to be good through July and there is a distinct summer group of species every year. Above 10,000 feet collecting picks up during the middle of June and is good through July. Above tree-line mid-July through August is the most productive period. Throughout Colorado ideal collecting stops about the end of August.

The Lepidoptera of the state are rather poorly known. Small areas west of Fort Collins, Boulder, Denver, and Colorado Springs have been collected with some regularity and thoroughness. The same is true of the northern part of South Park, an area west of Capulin in the San Luis Valley, and around Fruita on the western slope. Most of the mountainous areas have been sampled. The eastern plains and the western plateaus and canyons are practically unknown; there the season is early and about over when outside collectors can visit. The six known resident collectors in Colorado live in or near the mountains and do their collecting in the high lands.

Generally speaking the fauna of the Canadian, Hudsonian, and Alpine Zones in the mountainous mid-third of the state is uniform from north to south. Of course there are local variations, but most of the species found in one range will be found in the others. The Transition and Upper Sonoran Zones on the eastern plains carry a fauna different from that in the same zones on the western slope. In the east there is a noticeable difference between the fauna of the Platte watershed and that of the Arkansas. Except in the extreme southwest, the fauna of the western plateau country is reasonably uniform and essentially that of the Uinta Basin in Utah.

For collectors wishing to spend a profitable summer in one area I would suggest any of the mountain ranges. The Front and Park ranges are pretty well known. The others have been visited only casually. Probably the most interesting unexplored areas lie in the Sangre de Cristo range facing the eastern plains between the Arkansas River and the New Mexican boundary.

For the collector wishing to sample the state during the month of July, I suggest the following itinerary: Come in from the east through Denver, collecting in the cottonwood groves and open prairies en route. From Denver go southwest through Morrison to Fairplay; work the oak thickets for Theclinae. Beyond Morrison work Turkey Creek and Bailey (Minois meadi Edw.); both are Mead stations from which Edwards described many "Colorado" species. From Fairplay head north over Hoosier Pass to Breckenridge and Dillon. Stop in the top of Hoosier (11,400 ft.) and go up to tree-line afoot; DON'T TRY TO DRIVE THE WOODROAD. In July you will get a good sample of alpines here, including Erebia callias Edw. Try the high willow bogs near Alma and on the way down to Breckenridge for some late Boloria (frigga sagata B.& B., freija Thun., eunomia alticola B.& McD.). From Dillon turn west to Leadville via Fremont Pass. At Leadville turn south to Twin Lakes; work the dry hills south of the lakes for Philotes battoides centralis B.& B. You will find it on flowers with Plebeius acmon lutzi Gertsch. Go westward over Independence Pass (12,200 ft.). There is good collecting on the eastern approach and at the summit. Drop down the western side to Aspen and Glenwood Springs. From Glenwood continue westward to Grand Junction, working the roadsides for Speyeria and Theclinae. From Grand Junction strike southeast to Montrose and Ouray: pretty good collecting all the way. Take the Million Dollar Highway over the top to Silverton and then down to Durango; there is good collecting most of the way. From Durango head eastward to Pagosa Springs and Wolf Creek through excellent collecting country. Continue to Alamosa, LaVeta Pass (a low one), and Walsenberg. This is a little late for the San Luis Valley but some Skippers will fly. From Walsenberg go northward to Pueblo and eastward along the Arkansas to Kansas. This last leg will yield little, but what you take will be interesting. You may find rarities like Leptotes marina Reak. and Yvretta rhesus Edw. and carus Edw.

(continued from page 45)

by F. Martin Brown
Colorado Springs, Colo.

IV. SAMPLE SIZE

In the section of the preceding article devoted to frequencies I presented Table 6 showing how the size of the sample affected the S.D., 95% limits and 99% limits of a frequency. I want to discuss this table a little more. For convenience it is repeated.

TABLE 6.

The Standard Deviation and Certain Limits for 37.5% Frequency

N	S.D.	95% limits	99% limits
8	17.1%	4.2-70.8%	0 -81.6%
16	12.1%	13.8-61.2%	6.4-68.6%
64	6.1%	25.6-49.4%	21.4-53.2%
200	3.4%	30.8-44.2%	28.7-46.3%
1000	1.5%	34.5-40.5%	33.5-41.5%

The table makes it evident that as the sample size increases the S.D. decreases. It is also evident that as the sample size increases the limits become narrower. All of this, of course, applies only to samples drawn from the same population. Such a table is easy to construct for any frequency that is desired. I explained in Section III how to calculate the S.D. of a frequency. The 95% limits are found by adding to and subtracting from the chosen frequency a number that is 1.96 times the S.D. To determine the 99% limits you use 2.58 as the multiplier of the S.D.

When samples that are not the same size are being compared, the safest procedure is to use the limits established by the smaller sample. For greater accuracy arithmetically, or when in doubt, take the square root of the sum of the squares of the two S.D. involved as the S.D. of the difference. Let me show this by example: Suppose that we have a pair of samples, the larger numbering 64 specimens, the smaller 16. The frequency for a character among the specimens in the larger sample is 25%; this yields an S.D. of 5.4%. The frequency with which the character appears in the smaller sample is 50%, with an S.D. of 12.5%. Calculating the limits and putting the data into a table we have Table 7.

Since the case is doubtful it is best to test the difference in the conventional manner, as follows. The S.D. of the difference between the two frequencies, computed as outlined above, is 13.6%.

TABLE 7.

Certain Data on Two Frequencies

N	F	S.D.	95% limits	99% limits
16	50%	12.5%	25.5-74.5%	17.7-82.3%
64	25%	5.4%	14.4-35.6%	11.1-38.9%

When the difference, 25%, is divided by 13.6 we get a "t" score of 1.8. Such a difference may be expected about once among 14 samples drawn from the same population. I would not consider it significant.

A much simpler method for determining the probability that the two samples were drawn from a single population is that found in the Chi-Squared test. This will be explained in the next article in this series. In fact, the Four-fold Table method for applying the Chi-Squared test was designed for just this sort of problem. Chi-Squared in this case is 3.8 and from the tables we find that P = 0.05. This means that we might expect to find 5% of the samples drawn from a population with differences as great or greater than occur in our example.

Turning from frequencies to linear measurements and indices, we find the effect of the size of the sample is equally important. However, in these cases the sample size has already been taken into consideration. Sample size enters directly into the calculations for both the S.D. and $p.e._m$ of such measurement. For the comparison of two series we use the $p.e._m$. Here it is easy to see that as the sample size increases when the S.D. is constant, the $p.e._m$ decreases.

I hope the above paragraphs make it clear that the arithmetic involved in the statistics we have studied takes into consideration the size of the samples. It should show why the larger the sample studied, the better or more representative the parameters derived from the sample.

Another factor that involves sample size is the interpretation of "t" scores. The significance of the value of "t" depends in large part upon the chance the investigator is willing to accept. In many fields of statistical investigation significant values for "t" have been accepted. It is reasonable to accept a lower value of "t" as significant in planned and controlled experiments than for studies of uncontrolled natural populations. Raymond Pearl, one of the greatest American students of the statistics of natural populations, insisted that to be significant "t" must equal at least 6 when data from samples of a natural population are being examined.

He was primarily interested in man, an animal about which there is sufficient information to establish with some degree of accuracy limits to the size of the population. Our studies revolve about animals for which there is little knowledge of the total population from which our samples are drawn. Further in this article I shall present some very crude estimates of the size of the ANNUAL CROP of two species of butterflies. When data is drawn from the various annual crops over a period of years the population that has been sampled reaches enormous dimensions. Because of this I prefer to go one unit beyond Pearl and generally use 7 as the critical number for "t". In Table 8 I have presented the value of "t" in terms of chance. The nearest whole number has been used for the smaller values of "t". For the larger values the numbers have been rounded off to three significant digits. The term "billion" is the American billion -- 10^9.

TABLE 8.

The Probability
of a Larger Deviation in Terms of "t"
Between Samples Drawn from the Same Population

"t"	when p.e. is used	when S.D. is used
1	1:1	1:3
2	1:5	1:21
3	1:22	1:369
4	1:142	1:15,772
5	1:1,341	1:1.7 million
6	1:19,300	1:500 million
7	1:427,000	1:400 billion
8	1:14.7 million	
9	1:730 million	
10	1:65 billion	

[Here again I quote Mr. Calhoun's comment since it throws light on the perplexing problem of dealing with a natural population as opposed to a controlled experiment. "I think the discussion may be misleading. I would respect Pearl's judgment that a "t" of 6 is good in population work, but would suggest that the reason is not based on probability. Just the opposite. Such astronomical probabilities as are associated with high "t" values are, I submit, fantastic and quite meaningless as standards of significance. If my "t" told me RELIABLY that I ran a rask of 1 chance in 1000 of being wrong in drawing a certain conclusion I would only ask more if my life depended on the decision. The important point here, I think, is "t" is judged NOT TO BE RELIABLE. In other words we believe that in dealing with natural populations the probabilities that go with a t-test ARE NOT THOSE LISTED IN THE TABLES, and are in fact dangerously lower. The difficulty is in the "normality assumption" for the population, and, much more, in the uncertainties of the sampling procedure. We are afraid (justly) of having gotten samples from two different, localized pockets in which the homogeneity of the samples lead to a falsely small S.D.

"The point of the emphatic comment is that I think the next advance is in the direction of abandoning guesswork on how large "t" should be for safety, and rather of trying to make good estimates as possible of (a) the normality of the population and (b) much more valuable: estimates of how much the S.D. has been underestimated."]

Here is how Table 8 is read: If the "t" score of the difference of two means is 1 -- the p.e. having been the basis used -- such a difference is to be expected every other time that samples are drawn from a true population. If the "t" score of the difference between two means is 6 then such a difference is to be expected from ONE sample among 19,300 drawn from a homogeneous population. Similarly if the Standard Deviation is used as the basis for "t", as in the case of frequencies, a "t" score of 1 is to be expected once among four samples (actually 3.7 samples) and a "t" score of 6 once among 500 million samples.

To assume that the same "t" score is going to have the same significance in two problems is poor science. Let me explain my reasons for saying this.

Every sample is a definite fraction of a finite whole population of a species. Unfortunately, with the exception of man, we have no real idea of the size of the population of any species. Species are often considered "rare" or "common" depending upon their occurrence in collections. This in turn depends upon how actively the habitat of the species has been collected. It also depends upon the collector-interest in the species. For instance, my collection contains about a half dozen specimens of Pieris rapae (Linné) and over 100 Colias behrii Edwards. I think you will agree with me that in nature behrii is not 17 times as abundant as rapae! There collector-interest determined the number of specimens in my collection.

The determination of the size of a natural population is extremely difficult. In fact it seems well nigh impossible to do it with any degree of accuracy. Fully realizing this I have attempted to gather some crude estimates of population size. The conclusions I reach below may be as much as 100% in error. I believe their only significance is as estimates of the LOWER possibility of the size. If in time I feel that the results are worthwhile I will publish the data in detail with its supporting statistics. Here are assays on two species stripped to the bare essentials to make my point.

Parnassius smintheus sayi Edwards: This is a common form in most of the forested areas of the Rocky Mountains. I have made some estimates of the density of its population in Colorado and particularly in El Paso County. At the peak of the season, there appear to be 120 individuals per acre in El Paso Co. and other areas in Colorado. In El Paso Co. there are about 60,000 acres occupied by the species. This means that at the peak of the flight there are AT LEAST 7,200,000 individuals in the County. The area just considered is probably less than 0.001 of the total area occupied by sayi. So I do not think it an exaggeration to say that the annual crop of sayi is over 7 billion individuals!

If while studying the variation of this subspecies I use a series of 70 individuals, my conclusions are based upon ONE TEN-MILLIONTH of the annual crop! Under such conditions the errors due to the size of the sample are bound to be great. Just suppose that the "average" New Yorker were to be described from one randomly selected individual! Or the "average" American from 15 persons randomly selected from one locality. Yet isn't that just what is being done by the vast majority of taxonomists?

Boloria frigga sagata (Barnes and Benjamin): This is a form that might well be considered rare. During 1950 I made some estimates of its population density over almost all of its known range. At the peak of the flight there were about 12 individuals per acre. The area occupied by this insect is something under 10,000 acres. This would put the 1950 crop at about 120,000 individuals. For this insect a sample of 70 specimens comes close to being one two-thousandth of an annual crop.*

Now let us see how all of this affects the significance of"t". First let us examine the situation as it exists for sayi. The total population will yield at least 100 million samples of 70 specimens each. On a purely mathematical basis I should seek a "t" score of at least 8.5 before stating that two samples are different (see Table 8). However I feel confident that my sample is not composed of the 70 most extreme specimens in the entire population. So when comparing this sample with another I will not require so high a "t" to indicate a significant difference. By using some high-powered mathematics I arrive at a "t" score of about 5.5 being significant in the case of this subspecies. This is for studying the variation WITHIN the subspecies. For comparing this subspecies with another I will stick with the suggestion made earlier and use a "t" score of 7.

Applying the same reasoning to sagata and using a sample size of 30 specimens I find that the SAME DEGREE of variation as "t"± 5.5 for sayi will be indicated by "t"± 3.6. Again this applies to variation within the subspecies. For comparing this subspecies with others I am willing to grant significance to a "t" score of 5. In this and the preceding paragraph I have used "t" scores based upon p.e. For those involving the Standard Deviation I would use 3.9 instead of 5.5 for sayi and 2.5 instead of 3.6 for sagata.

* Ed. note: This figure should not be quoted too freely by future investigators of population-size. My experience suggests that the sagata colonies occupy much more than 10,000 acres. C.L.R.

[To be continued]

EDWARD C. JOHNSTON

In the passing of Edward C. Johnston in his sixty-third year, entomologists lost a field collector of great distinction, and those of us who knew him personally lost a treasured friend. Mr. Johnston died 9 April 1951, of a coronary attack in his home at Seattle, Washington. He was a Charter Member of the Lepidopterists' Society.

Edward Johnston was general manager of the fur seal administration in the Pribilof Islands for ten years before his retirement in 1950. He had been with the Fish and Wildlife Service for twenty-six years. He was born in Cottonwood Falls, Kansas, and graduated from the University of Kansas in 1911.

Although possessing the training and methodical thoroughness required of a taxonomist, Mr. Johnston preferred to limit himself to field collecting. At least thirty-five new species and other forms of Lepidoptera were described wholly or in part from material collected by him. But he is perhaps best known entomologically for his fruitful collecting in the Pribilof Islands, Alaska, where he increased the number of known species of Heterocera from eight to twenty species. (See his paper in the Lep. News, vol.4: pp.27-30; 1950.) He also collected quantities of Coleoptera and Trichoptera that he generously passed on to his friends. A fine collection of land shells was donated to the California Academy of Sciences some years ago, for which he was made a life member. One new species of plant was also described from material that he collected. Five species of moths were named in his honor: Eupithecia johnstoni McD., Platyptilia johnstoni Lange, Scopula johnstonaria McD., Orthosia johnstoni McD., Euxoa johnstoni McD., and Chionodes johnstoni Clarke.

Edward Johnston was happiest when he could leave behind the cares of the office and spend a few days and nights in some of the beautiful collecting locales of the West.

Donald P. Frechin
Bremerton, Washington

[Mr. Frechin has obtained the very extensive Johnston collection of moths. Mr. Johnston was always cooperative in supplying material to taxonomists for revisional studies, and Mr. Frechin will also honor all requests from specialists for material in the collection. - Editor.]

RESULTS OF HUMIDITY TESTS WITH PAPILIO PUPAE

by P.H.H. Gray
Macdonald College, Quebec

A female Papilio ajax L. (= polyxenes Fab.), with wing-radius of 48 mm., was caught on 15 Aug. 1951. It laid about 75 eggs on parsley under a wire-screen cage, in the garden, and died on 18 Aug. The larvae fed on the parsley under the cage until 22 Sept., when the temperature fell to 40° F., and all were brought into the basement, at 67°, and kept in large box-cages. The boxes were lined with card, upon which the larvae began to suspend on 27 Sept. On 6 Oct., 68 pupae were counted, cut away from the card, and stored under different conditions.

Twenty-eight were placed each in a small tube, and the tubes in groups of seven in jars, which in turn were placed in atmospheres of differing relative humidities, 100, 80, 40, and 20 per cent; air (pupal) humidity, and that developed from moist soil. The first four conditions were obtained by means of water (for 100%), KOH solutions at specific gravities of 1.175 (for 80%), 1.380 (for 40%), and 1.490 (for 20%). These specimens were kept in the basement.

A group of nine was placed in the cold store, where the temperature fell to 40°, and the humidity was that of outside the house. Fourteen had suspended on the wooden ceiling of a cage; this cage was placed under a closed porch, in a closed garden shed, where the temperature was only a little higher than outside.

The first insect to emerge was one from the group in the basement, on 16 Dec.; the last of this group emerged on 12 Feb., twenty-one emerging between 6 and 28 Jan. The jars containing the groups of seven pupae were removed from their relative-humidity conditions on 16 Dec., the outsides of the jars washed and dried, and the jars placed in separate wire-gauze cages. Those wintering in the cold store were transferred to the basement (66°) on 15 Feb.; these emerged between 3 Mar. and 7 Apr. Those that were under the porch were transferred to tubes in the basement on 15 May; the last of these emerged on 28 May.

The conditions, numbers of insects, and averages of the wing-radii of the insects under each condition, are given in the Table.

The following points can be noted, in addition to those relating to the wing-radii, which will be discussed later: the saturated atmosphere, from water, caused all seven pupae to die, the contents having an odor of bacterial decomposition; the humidity produced by moist soil appeared to be close to that of saturation, as judged by the deposit of free water on the inner wall of the jar, but three females emerged; and 40% relative humidity desiccated the pupae, which remain as hard dry well-preserved specimens.

The outstanding result of breeding this series is that the wing-radius of each specimen of 19 ♂♂ and 19 ♀♀ is significantly less than the average for wild specimens. This is shown clearly by the figures given below. The wing-radii of the bred ♀♀ are not significantly longer than those of the bred ♂♂.

Bred 1950		Wild	
♂♂ (19)	36.1 mm.	1949,1950 (6)	46.3 mm.
♀♀ (19)	39.1 mm.	1945-1950 (10)	45.7 mm.

(The 10 wild ♀♀ include one of 55 mm. The wing radii of wild specimens caught in 1950 measured as follows:

♂♂ (4); 45, 47, 47, 48; ave. 46.8
♀♀ (6); 41, 42, 45, 45, 47, 48; ave.44.7)

It would be unnecessary to demonstrate the statistical level of the significance of the difference between the bred and the wild specimens; it can, however, easily be shown that the difference between them, of either sex, is of a high level of significance, the statistic t being, for one random set of six of the bred male specimens, compared with the six wild ones, about 6.7; the probability of such a value being obtained by chance is much less than once in a hundred cases.

RELATIVE HUMIDITY TEST WITH PUPAE OF PAPILIO AJAX, 1950, 1951

Set	Condition	No. of pupae	Emerged ♂♂	mm.	♀♀	mm.
A	Outside	14	4	35.5	5	37.2
B	Cold store	9	8	36.8	1	39.0
C	100% r-h	7	0	-	0	-
D	80% r-h	7	1	34.0	5	39.5
E	40% r-h	7	0	-	0	-
F	20% r-h	7	4	36.5	3	40.0
G	Pupal r-h	7	2	35.5	2	39.0
H	Soil r-h	7	0	-	3	40.7

Note: five were crippled; four yielded a parasite; two (H) were moldy; one (H) dried; one (A) decomposed; one (B) did not emerge. One ♂ of A measured 32 mm.

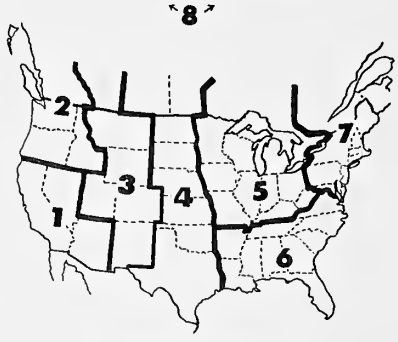
The time has now arrived for the preparation of the Society's annual Field Season Summary. This has the dual object of keeping the members in touch with the season's collecting activities in North America, and of assembling a permanent record of variations in the occurrence of Lepidoptera from year to year.

The success of the Season Summary depends on the willingness of lepidopterists to contribute information to it. In past years reports have been received from only a fraction of the active members. Some have been unable to spare the time to write out even a brief account of their experiences during the season, but probably many more have simply been too modest about the value of the contributions they could have made. Experience has shown that even brief reports, giving data on a few species, may fill in a missing piece of the general distribution picture. The ideal report from an individual observer is an elaborate document, requiring lengthy preparation, based on extensive field work. It is rare, however, for even professional entomologists to have time or facilities for the working up of a report of this kind. The backbone of the summary has invariably been formed by the piecing together of the small reports of a large number of observers who have each had only limited time to spare for collecting and reporting on collecting. Do not, therefore, fail to send in a report only because you feel that it is less complete than you would have wished to make it. Meagre information, as long as it is accurate, is better than none, and the smallest contribution will be welcomed by the regional co-ordinator. Full credit is always given to contributors to the Summary.

It is often not possible to publish in detail in the News all the data sent in by contributors to the Summary. Records that are not published are not, however, lost; they are incorporated in a permanent file maintained by the Society, and form from year to year a cumulative record of present and past conditions.

As in past years, information is desired bearing on the following subjects: 1) relative abundance and normal or abnormal times of occurrence in the fauna as a whole; 2) correlation of these with environmental conditions, natural or artificial; 3) variations in abundance or time of appearance of particular species, and the apparent causes, if any, of such variations; 4) migrations; 5) unusual occurrences, extensions of known range, establishment or spread of species introduced from abroad.

Reports should give as much as possible of the following information: a) area covered and extent of collecting; b) weather during the collecting season and during the preceding winter; c) comparison of the season as a whole with the preceding season (whether all or some groups were more or less numerous, whether emergences were earlier or later in various parts of the season); d) factors likely to affect success of collecting (as opposed to actual abundance or rarity of the Lepidoptera); e) status of natural enemies; f) artificial changes in the environment (clearing, burning, draining, cultivation, insect control measures, etc.); g) dates of occurrence and relative abundance of particular species -- if the list is extensive, orderly arrangement, either by taxonomic position or by date of occurrence, is desirable, and if a number of localities are covered these should be arranged geographically; in this section COMMON SPECIES SHOULD NOT BE NEGLECTED, as they are more likely to yield data comparable from year to year and from one place to another than are scarce species; the approximate date of the main emergence of a species is more significant than the date of the first individual's appearance; h) ideally the full flight period should be specified, with separate broods if possible being distinguished; i) what known migrant species were present and in what numbers, and details of any past or directional movements observed; j) unusual occurrences; new state, province, or area records; progress of introduced species; k) outbreaks of pest species.



SEASON SUMMARY ZONES

As usual, the continent is divided for purposes of the Summary into eight areas, shown on the map. For each area a separate summary will be prepared by the area co-ordinator, an active lepidopterist resident in the area. REPORTS SHOULD BE SENT DIRECTLY TO EACH APPROPRIATE AREA CO-ORDINATOR BEFORE DECEMBER 10. A list of the areas and co-ordinators follows:

Area 1. (Southwest) - LLOYD M. MARTIN,
Los Angeles County Museum, Exposition Park,
Los Angeles 7, Calif.
Area 2. (Northwest) - J.C. HOPFINGER,
Brewster, Wash.
Area 3. (Rocky Mountains) - J. DONALD EFF,
820 Grant St., Boulder, Colo.
Area 4. (Great Plains) - H.A. FREEMAN,
1335 Overhill Drive, Garland, Texas.
Area 5. (Central) - P.S. REMINGTON,
5570 Etzel Ave., St. Louis 12, Mo.
Area 6. (Southeast) - RALPH L. CHERMOCK,
Dept. of Biology, University of Alabama,
University, Ala.
Area 7. (Northeast) - S.A. HESSEL,
8 Woodmere Blvd., Woodmere, L.I., N.Y.
Area 8. (Far North) - T.N. FREEMAN,
Division of Entomology, Central Experimental
Farm, Ottawa, Ontario, Canada.

Mr. Freeman is the new coordinator for Area 4, replacing Mr. Stallings, who had asked to be relieved of the duty after four years. Mr. Hessel replaces the writer for Area 7.

Eugene G. Munroe

FIELD NOTES

MORTALITY OF NYMPHALIS MILBERTI LARVAE

During the summer of 1950 I collected about fifty fully grown larvae of Nymphalis milberti (Godt.) from patches of nettles growing on low land near the salt water. Though a few of these were killed for specimens, the greater number I kept alive in the hope of rearing some butterflies. From all these larvae I did not get one adult. As far as I could make out they were parasitized 100 % by a tachinid fly. A few may have died from other causes, but great numbers of dipterous pupae were in the cages.

The evident abundance and destructiveness of this particular parasite seems to fit in very well with the scarcity of N. milberti during the summer months. (See Lep. News, vol.4: p.13.) On the other hand I have no evidence to show the butterfly is a migrant persistent enough to continue restocking the locality regularly. Some day the marking and releasing of butterflies may shed some light on this question.

Richard Guppy
Wellington, B.C.

OVIPOSITION OBSERVATIONS

The following notes were made in the vicinity of Ithaca, New York. I regret that none of the plants were identified.

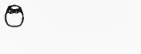
On 2 July 1949 at noontime, a Meadow Fritillary, Boloria toddi (Holland), was seen depositing an egg on a half-dead blade of grass. The grass leaf was green and brown and near some violet plants. This particular butterfly landed and proceeded to walk over leaves and grasses, and beneath small growths of various field plants, such as wild carrot, mustard, dandelion, etc. It was hidden from view at times, then walked up into the sunshine, flew off a few feet and landed near other violets. Sometimes it landed on violets, but never seemed to lay any eggs on the plant, at least none that I could find. On 19 Sept. 1949, another B. toddi was seen at noon. It laid an egg on a dead stem of wild carrot. The stem had been cut down and was lying among other dead vegetation. I saw no violets around, but no thorough search was made. This oviposition was near the same area as that of 2 July.

Polygonia interrogationis (Fab.) was observed while it laid five eggs. At the time I was not sure what was going on. I was in the shade of a small elm tree and all that could be seen was a silhouette of leaves and butterfly against the sky. It was difficult to know whether I was seeing a butterfly or a leaf. It had not moved after it first landed except to pivot once. After a minute or so it suddenly flew off and did not lay any more eggs on that tree. This butterfly was noticed only because I was watching and hoping for it to show up, so I could get some eggs. Investigation showed it had laid five eggs on the serrated edge of a small leaf at the end of a branch. These eggs have a sparkle to them, and so have the eggs of the Painted Lady, Vanessa cardui (L.).

Vanessa cardui is one species that I would say lives dangerously. Laying eggs on thistles must be a ticklish job. I know picking the leaves with the eggs is no pleasure. On 5 August 1949 one was seen laying eggs on some small thistles that were only 6 to 8 inches high. They were second growth plants, the field having been cut over a few weeks previous. I watched her place one egg and found it easily. I could not find any more eggs then, so came back a few minutes later and carefully searched the group of thistles. Four more eggs were found. All were laid on the upperside of leaves, and one right on top where small leaves were unfolding, which place is a mass of spines. Naturally, all eggs were laid near a spine or spines. The wavy edge of the leaf makes it difficult to find the eggs. Turning the leaves this way and that I could locate the eggs by their sparkle. Two eggs, about 1/2 inch apart, were on the same leaf. I picked five eggs knowingly but the total came to six; one egg did not have the sparkle that the others had so perhaps it was laid a few days earlier. A few days earlier I had noticed another cardui ovipositing on burdock. Two eggs were found and picked. One was laid on a flower bed right in the midst of prickles. The second one was placed on the underside of a small leaf beneath a flower bud. The times of ovipositing were at noon and 5:45 p.m. All eggs hatched in 3 days.

The Least Skipper, Ancyloxypha numitor (Fab.), seems to bounce through the grass, stopping here and there to place an egg on a grass blade. On 5 June 1949, I observed one that landed on a blade of grass and the abdomen curved to place an egg. A gust of wind made the grass twist so that the butterfly was on the opposite side of the leaf and out of view. Twice this happened but the egg was finally laid on the upperside of the blade. This particular grass has a very broad blade, about 1/2 inch across at its widest part. Eggs were also laid on narrow grasses, but mostly on these broad grasses, of which there is a good-sized patch on a slope. On 13 August I again observed numitor laying eggs on this broad-leaf grass.

Joseph A. Keji
Ithaca, New York



NOCTURNAL MOTHS FEEDING IN DAYLIGHT

While a few Phalaenidae species, chiefly among the Plusiinae, can be commonly seen flying in daylight, most are very strictly nocturnal. It may be of interest to note that on 26 Aug. 1950 I observed a number, probably 25 or 30 individuals, of Feltia ducens Wlk. flying in bright sunshine, about four in the afternoon. The moths were visiting and feeding in flowers of Grindellia and were easily caught. I took enough to make identification certain, and let the remainder go, as the species is very common.

Richard Guppy
Wellington, B.C.

NOTES ON COLLECTING POLYGONIA FAUNUS SMYTHI

Every year for the preceding five years I have had fun in pursuit of this rare subspecies but have never been able to collect it in great numbers. In 1950, however, I succeeded a little better than previously, probably owing to my green net bag, which enabled me to capture six. This subspecies, which is still unknown to many collectors, is no doubt the shyest and swiftest flier of all the eastern Polygonia and only found on mountain roads in the Great Smokies at an elevation of about 3000 ft. I have never seen it settled on flowers, but always on dirt roads, and even with favorable weather conditions I have passed days without seeing even one. I cruise slowly with my car in low gear over these roads, at times for miles before I detect one. Their habit is peculiar, and it takes patience and a keen eye to detect them on the dusty roads surfaced with coarse gravel, but whenever I see what appears to be the edge of a little blade sticking out of the ground then I know it is Polygonia faunus smythi Clark.

A typical experience for me is about as follows. I stop the car within about twenty feet. The "blade" has not moved; perhaps I have made a mistake; but no, a little breeze is tilting the insect slightly to one side reminding me of a wind blowing into a sail. Approaching very cautiously, I now can see the black underside; surely I will be able to capture it. I am less than ten feet away, but the net will not reach and it casts a shadow. The insect stirs; sensing danger it darts into the wood. It moves so quickly that I fail to notice for a few moments that it has already emerged again and settled perhaps thirty feet below where I was standing. Having another chance, I creep up again to almost within net length but it will not wait. This precedure will recur perhaps three or four times, after which the smythi finally disappears. Even when I come back after several hours or on the next day, hoping that I will find it again on that spot, I meet with disappointment.

A year earlier I had been advised that I would waste my time trying to sneak up on them, and that the only way to capture them is to intercept them. But I could not apply this tactic inasmuch as they were flying in the opposite direction. It seems strange that a light drizzle of rain does not disperse them. I caught three under such circumstances although some others when disturbed would fly underneath the embankments for protection. There the net is useless, and I have lost quite a few this way. The foodplant and larva is unknown to me. They fly at the same time as Speyeria diana (Cram.), the beginning of July. I have also captured some at the end of July and always in excellent condition.

Theodore Bock
Cincinnati, Ohio

HILLTOPS AND ANTHOCARIS

Dr. J. Benjamin Ziegler and the writer took a two-day field trip, 15-16 May 1951, with high hopes of netting some of the interesting Incisalias, etc. We scoured the environs of Mount Peter, situated at the northern extremity of Greenwood Lake, in the State of New York. With the exception of a few Incisalias irus (Gdt.) and Hesperia metea (Scud.), our efforts were more or less in vain. However, we experienced something so peculiar that we believe that other lepidopterists might be interested. The circumstances are as follows. We were anxious to take a series of Anthocaris genutia midea Hbn. but during several hours' search in what looked like a favorable habitat neither of us saw a single specimen. After a "bucolic lunch" one of us (G.W.R.) became fascinated with a rocky outcropping, some thirty feet or so higher than the surrounding terrain, which promised possibilities of interesting flora (if not Lepidoptera). After the top of this outcrop of crystalline rock had been gained, what should appear but two male genutia in bloodless combat. One was netted, the other escaped. The netted specimen was barely dead in the cyanide bottle when another male appeared, and so on until a total of four specimens (all males) had been secured. Dr. Ziegler happened to be within hailing distance, so after hearing what had happened he was advised to take the writer's place to see if genutia persisted in assuming an "elevated position" in lepidopteran society. Apparently this was the case because he took three more males within the course of a few minutes. In all, seven males were secured, not a single female being seen at any time. The peculiar circumstances connected with this incident are that no specimens of genutia were seen anywhere else in the environs of Mount Peter although we did see one specimen (possibly a female) while driving home at a lower altitude.

The question naturally arises: - what kind of "tropism" or attraction is involved in occurrences of this kind? In other words, what are the factors which cause genutia and some other species of butterflies to prefer higher places? There must be a definite reason, so if anyone reading this episode can offer an explanation we, and possibly others, would be very glad to have it. Incidentally, rockcress or other suitable cruciferous plants for female genutia were not in evidence so these factors can probably be ruled out. Is it possible that high ground is selected by belligerent male genutia as a battlefield?

George W. Rawson
Summit, New Jersey

[Ed. note: From our experience in New Haven with A. midea, I believe the males simply indicated the beginning of the brood. It also seems probable that one or more species of Arabis were present on the outcrop, though perhaps inconspicuous. C.L.R.]

ON THE DISTRIBUTION OF HELIOPETES DOMICELLA (Erichson)

H. A. Freeman, in "Notes on Some Tropical American Skippers" [Field & Lab., vol.17: p.78; 1940] notes the scarcity of authentic North American records of domicella. In addition to those he listed may be added: Brown Canyon, Baboquiviri Mts., Arizona, 20 March and 24 March 1938, 1 ♂ each; Sabino Canyon, Arizona, 31 July 1940, 1 ♂.

J. W. Tilden
San Jose, Calif.

OBSERVATIONS ON THE BUCK MOTH, HEMILEUCA MAIA, ON LONG ISLAND, N.Y.

Although I have been interested in Natural History for many years, it is only since 1948 that I have attempted to make a collection of our local Lepidoptera. I had looked for Hemileuca maia (Drury) weekly, during September and October of 1948 and 1949, but without success. On 14 Oct. 1950 I saw my first one about 3 miles north of Westhampton Beach Railroad Station, which is about 75 miles east of New York City. It was seen at 1:30 P.M. and the temperature was 60° F. with bright sun.

On 16 Oct. between 10:30 and 11:00 A.M. one moth every minute flew by me as I was stationed on a dead-end road about one mile north of Westhampton Beach Railroad Station and near the Westhampton Airport. The temperature was 60° with bright sun. There had been a heavy frost the night before, temperature down to 40°. All maia had stopped flying by 2 P.M. This locality later proved to be about the center of abundance of this species as I checked for about 22 miles east and about 12 miles west for this moth. About every 200 ft. for at least a mile was a dead moth run over by cars travelling on this main road across the Island, 7 miles north and south, between Westhampton Beach and Riverhead. This road runs through the center of the scrub oak, food plant of this moth, and which is found only in the central portion of Long Island. This stretch is undeveloped with not a single house, outside of a small airport.

On 17 Oct. I arrived at Westhampton airport at 7:30 A.M., 47°, clear, no wind. The first maia was seen at 8:20, next at 8:28, and the next at 8:38 for an average of 3 per hour. From 10:30 to 11:00 A.M., temp. 62°, 37 were seen (I collected 9), for an average of 74 per hour. From 11:00 to 11:30 27 were seen (5 collected) for an average of 54 per hour. From 11:30 to 11:45 I saw 9, for an average of 36 per hour.

On 18 Oct. it was cloudy, temp.60°, and the first maia was not seen until 9:17 A.M. I went 7 miles east to Hampton Bays and only saw a single one there about 10 A.M. in typical scrub oak area. I then went east to Sag Harbor, 22 miles east of Westhampton Airport, and did not see a single one although the scrub oak occurs there. Roy Latham of Orient also after many years of searching has not been able to find it around Sag Harbor. He too has never seen it east of Hampton Bays. He says it does not occur between Riverhead and Orient Point (northeast tip of L.I.), a distance of 28 miles, because the scrub oak does not occur there. So it apparently does not occur between Hampton Bays and Montauk Point, a distance of 39 miles. I went back to Westhampton Airport and from 2:30 to 2:45 P.M., clear, 66°, only two were seen for an average of 8 per hour.

On 19 Oct. from 11:53 to 12:03 noon, 65°, slight haze, 20 were seen for an average of 120 per hour. From 3:10 to 4:15 P.M., foggy, 62°, only 2 were seen, the last at 4:12, for an average of 2 per hour. At 1 P.M. 2 were seen at East Manorville, 7 miles west of Westhampton Airport. On 21 Oct. from 8:00 to 8:50 A.M., clear, 50°, only one seen at 8:10. From 10:40 to 11:10 I saw 55 (12 collected) for an average of 110 per hour. On 22 Oct. about 10 were seen by Gilbert Raynor at West Manorville, 11 miles west of Westhampton Airport. On 23 and 24 Oct. none were seen, due presumably to continuous clouds and some light rain. On 25 Oct. from 11:15 to 11:45 A.M., clear, 60°, 32 were seen for an average of 64 per hour. It had rained until 8:30 but was clear by 10:30.

On 1 Nov. from 10:40 to 11:10 A.M., clear, 69°, 6 were seen (2 collected) for an average of 12 per hour. This was the last day any were seen and may be the latest date for Long Island. I understand it was 81° in New York City, which was the highest temperature ever recorded in any November in the history of the N.Y. City Weather Bureau. It rained all day on 4 and 5 Nov. so I did not go to the Airport. On 6 Nov. none seen from 11:10 to 11:50 A.M., clear, 50°. On 8 Nov. from 11:20 to 11:50 A.M., clear, 65°, none were seen.

It is of interest to note that only two females were seen, both unable to fly as their wings did not seem to be fully developed. The first was found on 21 Oct. and killed. The next was caught 25 Oct. in the road, kept overnight in a jar. The next morning there were about 100 light green eggs in the jar. It was kept for another day but the wings did not develop to the point where it could fly. It died in the jar the second day after I found it.

Roy Latham saw the first maia of the year, a male, at Great Pond, west of Riverhead, on Oct. 8, which he believes to be the earliest date for Long Island. This was the locality where Latham had found them in former years but could find none for the past three seasons. It is about 4 miles northwest of Westhampton Airport. Latham states that this moth is supposed to settle down by noon and only a few scattered individuals fly during the afternoon and when it is mild and still, even up to sunset. I too found this to be generally true; very few were seen after noon.

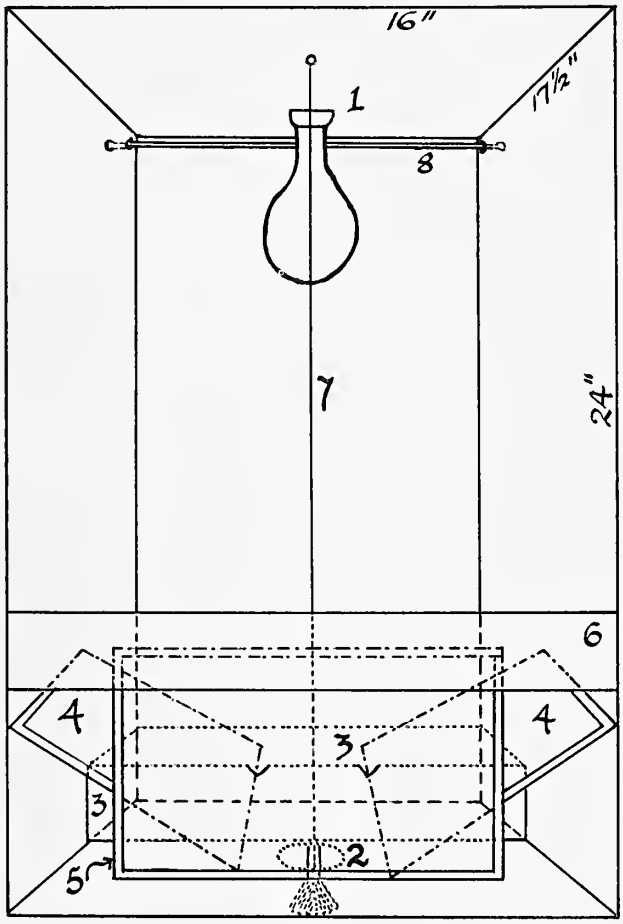
I found I could capture about 50% of all those within about 75 feet if I waited until they got out into the road. If I missed the first time with the net it was usually a waste of time to attempt further capture as they put on speed and usually went higher. Nearly all were flying less than six feet high. Nearly half of them feigned death after capture in the net or if they landed outside the net on the ground. (See Len. News, vol.4: p.46, 1950, where E.G. Voss of Michigan mentions his experience with Catocala feigning death, which he had never observed before among the moths.)

LeRoy Wilcox
Speonk, L.I., N.Y.

MAKE PLANS TO ATTEND
THE SECOND ANNUAL MEETING
CHICAGO NAT'L HISTORY MUSEUM, DECEMBER 28-29

by P. H. H. Gray
Macdonald College, Quebec, Canada

The following is a description of a simple portable light-trap, which has proved to be of some value during the past summer. Up to the time of writing (31 August 1951) about 150 different species of moths have been taken, including two Catocala species (cerogama and ultronia) and specimens of Celama pustulata, which latter has not hitherto been taken in this locale.



MULTIPLE-REFLECTOR LIGHT TRAP
transparent-perspective diagram

A packing carton measuring 24" by 16" by 17½", with the top removed, was lined with rough-surfaced white paper. Previously to putting in the paper, a circular hole 2" in diameter was cut in one end (now the top), its center 3" from the back, to admit a lamp fitment [(1) in the diagram (see figure)] and one of 3" diameter (2) in the floor (the other end of the carton), its center 9" from the open edge. A sloping shelf of the pasteboard (3), 5½" wide from front to back, was made to lie 3" high at the back sloping to a bar 2" high at the front, making a counter at the back of the box. The front edge of the counter is about ½" below the top edge of the bar, to enable two notches to be cut 5" apart in the middle of the bar. The notches are to admit the edges of the long sides of two mirrors in white frames. The other long sides of these two mirrors tilt back against the sides of the box, as shown (4,4) in the diagram. The near lower corners of these mirrors rest against a third mirror (5) which faces the back of the box, tilted at a suitable angle. The base (long side) of the third mirror may rest 3" to 5" inwards from the front edge of the floor; the top (the other long side) of this mirror rests against a bar of pasteboard (6) 2" wide fastened to the front edges of the box. In the experimental model being described the mirrors measure 10¼" by 8¼". (The lateral mirrors do not reach the front edges of the box, but are shown thus in the diagram to overcome the difficulty arising from perspective.) The front of the box from the top of the bar down is closed with black paper.

In operation the box rests on four feet, of a height sufficient to allow the circular hole in the floor to fit exactly over the open mouth of a bottle of cyanide; a pint sealer for the cyanide, and pint-sized ice-cream cartons have been found best for these purposes. Suspended by a string (7) from the roof is a small blackened glass funnel, of such diameter as just to fit within the neck of the cyanide bottle but swinging freely below the neck; this allows moths to enter the bottle but discourages their exit. A knot at the funnel end of the string will prevent the funnel from sliding down. The bottle rests in a can.

Moths attracted by the single lamp (100 watt power only has so far been used) find that they are confronted with seven reflections of it, and some plummet into the bottle after vainly trying to find an exit from the box; most of them rest on the paper and can easily be bottled by hand. The mirrors can be hinged inwards to scare up or bottle specimens that settle behind them.

No.8 in the diagram is a telescopic brass curtain rod, passing through holes at the top of the sides, 1" from the back; this is for coiling the extension cord (say 20 feet) and for carrying the whole outfit. The total weight of the apparatus, as made, is 8¼ lb. The cost lies in the lamp, its fitment and cord, and the mirrors.

NEW ASSOCIATE EDITOR

According to the Constitution, one of the four Associate Editors shall be responsible for the annual Season's Summary, published as the last issue of each volume of the Lep. News. It is a pleasure to announce that Dr. Eugene Munroe, of the Canadian Department of Entomology in Ottawa, has accepted this post. He is assuming responsibility for the Summary immediately, by supervising the eight area summaries for 1951 and preparing them for publication. His instructions to cooperators appear in this issue.

C.L. Remington

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped that eventually our coverage of the world literature will be virtually complete. It is intended that every paper published since 31 December 1946 will be included. Abstracts give all new subspecies and higher categories with generotypes and type localities. Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted.

Beginning with this issue abstracts will be listed in sections according to the content of the papers. Space limitations make it necessary to list each paper only once, under the most applicable heading; all papers containing descriptions of new subspecies or higher categories will be listed in section B. Headings are as follows: A. General; B. Systematic; C. Morphology; D. Variation and Genetics; E. Distribution and Phenology; F. Biology; G. Physiology and Behavior; H. Migration; I. Technique; J. Miscellany.

A. General

85. Bourgogne, Jean, "Ordre des Lépidoptères" [In French]. In Traité de Zoologie, vol.10, fasc. 1: pp. 174-448, 3 pls., 246 figs. Paris: Masson et Cie. 1951. General account of the order. Describes morphology and biology of all stages in great detail; summarizes classification, with brief to extensive descriptions of each family. [P.B.]
86. Herbulot, Claude, Atlas des Lépidoptères de France, Belgique, Suisse. Fascicule III: Hétérocères (fin) [In French]. 145 pp., 12 pls. Editions N. Boubée, Paris. 1949. This concluding volume deals with the Geometridae, Lasiocampidae and micros. See note in Lep. News, vol.2, p.88. [P.B.]
87. Hoffmeyer, Skat, De Danske Spindere [In Danish]. 198 pp., 23 pls., 24 figs. Aarhus: Universitetsforlaget. 1948. Descriptions of Danish macroheterocera (except Noctuidae and Geometridae, but including Aegeriidae, Psychidae, Limacodidae, Zygaenidae, Cossidae, Hepialidae). Adults of all spp., and larvae of many, are figured in color. [P.B.]
88. Hoffmeyer, Skat, De Danske Ugler [In Danish]. 347 pp., 32 pls., 58 figs. Aarhus: Universitetsforlaget. 1949. Companion volume to the last; covers all Danish spp. of Noctuidae. [P.B.]
89. Richards, A. Glenn, The Integument of Arthropods. The Chemical Components and Their Properties, the Anatomy and Development, and the Permeability. ix+ 411 pp., 65 figs. Minneapolis: Univ. Minnesota Press. 1951. A summary and synthesis of previous work on the subject. Invaluable as a reference. [P.B.]
90. van Son, G., The butterflies of Southern Africa. Part I. Papilionidae and Pieridae. 237 pp., 40 pls., 135 figs. Pretoria: Transvaal Museum (Memoir no. 3). 1949. Covers all South African spp. in these 2 families. Keys to families, subfamilies, tribes, genera, species, and named forms (in polytypic spp.). All categories are fully described. Black and white figures of all spp.; successive plates show both surfaces of all specimens. The ♂ and ♀ genitalia of all spp. are figured, as are other important structural details. Life histories, when known, are described and extensively illustrated. Habits are discussed, the distribution outlined, and localities of specimens examined are noted. This volume should be a model for all similar works on the Lepidoptera; the number and high quality of the illustrations is particularly impressive. [P.B.]
91. Various authors, Iconographia insectorum japonicorum [In Japanese]. 2d Ed. 1745 pp., 15 pls., about 5000 figs. Tokyo: Hokuryukan, Ltd. 1950. Brief descriptions of all spp. of insects found in Japan, each illustrated by good line drawings. [P.B.]
92. Viette, Pierre, "Lépidoptères Homoneures" [In French]. Faune de France, no.49: 83 pp., 68 figs. Paris: Lechevalier. 1948. Introductory account of morphology and biology of the Lepidoptera, with keys to suborders and superfamilies. Description of families, genera and spp. of Homoneura found in France (Micropterygidae, Eriocraniidae, Hepialidae), with keys; figures of some adults and ♂ genitalia of most. Distribution is given, and early stages are described (when known). [P.B.]

B. Systematic

93. Amsel, H. G., "Die Microlepidopteren der Brandt'schen Iran-Ausbeute. 2. Teil" [In German]. Arkiv för Zool., ser.2, vol.1: pp.223-257, 84 figs. 17 Oct. 1950. Pyralidae. Describes as new: APROCERATIA (type Proceratia rhectogramma Meyr.); OCRISIODES, O. chirazalis (Comé; Fort Sine Sefid); Nephopteryx rectangulella (Keredj); N. oxybiella (Bender Tchahbahar); Phycita mianella (Mian-Kotal; Sine Sefid); P. comeella; (Comé; Mian-Kotal; Sine Sefid); P. ardekanella (Comé); P. taftanella (Kouh i Taftan); P. balutchistanella (Bender Tchahbahar); Salebria nigrosquamalis (Sine Sefid; Comé); S. pittionii (Chiraz; Fort Mian-Kotal; Kouh i Binaloud); S. mimicralis (Comé); S. tchahbaharella (Bender Tchahbahar); S. acrobasella (Tchourum); SALEBRIODES, S. ephestiella (Fort Mian-Kotal); SEFIDIA, S. persica (Sine Sefid); PARASEFIDIA, P. benderella (Bender Tchahbahar); Ambesa umbriferella senganella (Fort Sengan); Pristophora khorassanella (Kouh i Binaloud); Rhodophaea farsella (Fort Mian-Kotal; Fort Sengan); subgenus RHODOPHAEOPSIS, and type sp. R. (R.) iranalis (Mian-Kotal; Comé); R. (R.) senganella (Fort Sengan; Kouh i Taftan); R. (R.) khachella (Fort Sengan); R. (?) taftanella (Kouh i Taftan; Fort Sengan); Tephris diversella (Jerico, Palestine; Fort Sengan); HAFISIA, H. lundbladi (Comé); Bostra bifascialis (Comé; Fort Mian-Kotal); B. farsalis (Comé); B. luteocostalis (Fort Mian-Kotal); Synclera interruptalis (Bender Tchahbahar); Loxostege malekalis (Tahte Malek); L. farsalis (Comé); Pachyzancla fascinalis (Bender Tchahbahar); ELBURSIA, E. stocki (Keredj): Pionea khorassanalis (Kouh i Binaloud); Pyrausta sefidalis (Sine Sefid); P. mechedalis (Kouh i Binaloud); Titanio hyrcanella (Chiraz; Fort Sine Sefid). Describes previously unknown ♂♂ of Emmalocera leucosarca and Aproceratia rhectogramma. Pyrausta levilinealis a synonym of P. pontica. Redescribes Melathrix praetextella. Figures ♂ genitalia and wing pattern of most spp., and wing pattern of 4 new genera. Type specimens and type localities not specified; all localities are given above (all in Iran unless otherwise noted). [P.B.]
94. Amsel, H. G., "Die Microlepidopteren der Brandt'schen Iran-Ausbeute. 3. Teil" [In German]. Arkiv för Zool., ser.2, vol.1: pp.525-563, 5 pls. 7 Apr. 1951. Pyralidae. Describes as new: Ancylolomia micropalpella (Sardze); A. benderella (Bender Tchahbahar); ARDEKANIA, A. farsella (Comé); Ephestia xylobrunnea (Bender Tchahbahar); Ancylosis arimanella (Comé; Nissa); A. cinnamomella persicolella (Comé; Sine Sefid; Keredj); A. sefidella (Sine Sefid; Chiraz); A. albicostella (Tchouroum; Chiraz); Aproceratia senganella (Fort Sengan); MECHEDIA, M. pristophorella (Kouh i Binaloud); TAFTANIA (type Pristophora oxycyma Meyr.); Synoria comeela (Comé; Sine Sefid); KHORASSANIA, K. hartigi (Kouh i Binaloud; Sine Sefid; Comé);

SCLEROBIODES, S. persica (Comé); Divona (Megasis) parvella (Comé); LARISTANIA, L. sardzella (Sardze; Bender Tchahbahar); UNCINUS, U. hypogryphellus (Comé); SENGANIA, S. rühmekorfi (Fort Sengan); Nephopteryx ardekanella (Comé); N. cornutella (Bender Tchahbahar); BELUTCHISTANIA, B. squamalis (Bender Tchahbahar); Rhodophaea bouchirella (Tchouroum); R. (Rhodophaeopsis) chirazella (Chiraz); R. (R.) persicella (Chiraz; Fort Mian-Kotal); Myelois micropunctella (Keredj; Chiraz; Fort Sine Sefid); M. britannicella (England; misidentified as M. cribrella); M. conformella (no locality); M. constans (Sine Sefid); PARAEMPORIA, P. monotona (Comé); Witlesia (Scoparia) silacealis (Comé); Bostra pseudospaniella (Mian-Kotal; Chiraz); B. comealis (Comé); KATJA, K. mira (no locality); Dattinia sardzealis (Sardze); D. hyrcanalis (Bender Tchahbahar; Sardze); D. mimicralis (Bender Tchahbahar); Constantia (Macroctenia) baloutchistanalis (Bender Tchahbahar); TCHAHBAHARIA, T. dentalis (Bender Tchahbahar); Evergestis affinis (Comé); E. paragrummi (Comé; Mian-Kotal); Loxostege mira (Bender Tchahbahar; Tahte Malek); Trigonuncus nissalis (Nissa; Keredj; Soultanabad); APYRAUSTA, A. persicalis (Sine Sefid); Titanio nissalis (Nissa); Tegostoma uniforma (Fort Sengan); Heliothela flavomarginalis (Sardze); Emprepes comealis (Comé). Describes the previously unknown ♂♂ of Pristophora velocella, Taftania oxycyma, Cybalomia triplacogramma, Phlyctaenodes platyphaea; synonymizes Myelois cinnerethella and ottoella under M. circumdatella. Figures ♂ genitalia of all new spp., and wing pattern and venation of some. The author's failure to identify type specimens or list type localities (all localities mentioned are given above) is most unfortunate. The procedure in naming M. britannicella, which is presumably based on the description and figures of ♂ genitalia given by Pierce and Metcalf, is scarcely valid![P.B.]

95. Bradley, J. D., "Notes on the family Arrhenophanidae (Lepidoptera: Heteroneura), with special reference to the morphology of the genitalia, and descriptions of one new genus and two new species." Entomologist, vol.84: pp.178-185, 6 figs. Aug. 1951. Describes as new: ECPANTHOPHANES, E. anachoreta (Sierra del Libano, Colombia); Cnissostages mastictor (Drosi, Costa Rica). Transfers Arrhenophanes chiquita Busck to Ecpanthophanes; synonymizes A. inca Meyrick under A. perspicilla Stoll. Describes and figures ♂ and ♀ genitalia of C. mastictor and A. perspicilla and ♂ genitalia of E. anachoreta, and figures venation of Ecpanthophanes. [P.B.]

96. Brooks, C. Joslin, "A revision of the genus Tenaris Hbn. (Lepidoptera: Amathusiidae)." Trans. R. Ent. Soc. Lond., vol.101: pp.179-238, 8 pls., 1 map, 1 fig. 10 Nov. 1950. Describes as new: T. catops gebiensis (Gebi Is.); T. gorgo gorgias (Rawlinson Mts., New Guinea); T. honrathi ladas (Oetakwa R., New Guinea); T. hyperbolus hyginus (Waigeu Is.); T. h. hyaeus (Nomnagihe, New Guinea); T. h. hyllus (between Kikori and Purari Rivers, British New Guinea); T. h. oenone (Central New Guinea); T. myops phrixus (Andai, New Guinea); T. alocus (Rawlinson Mts., New Guinea); also four new 'forms'. Figures of adults, ♂ genitalia, venation, and specialized scales. Gives a key to spp. [P.B.]

97. Collenette, C. L., "A revision of the genus Eloria Walker (Heterocera, Lymantriidae)." Ann. Mag. Nat. Hist., 12th ser., vol.3: pp.813-865, 3 pls. Oct. 1950. Describes as new: E. muzo (Muzo, Colombia); E. noyesi goyaz (Viannopolis, Goyaz, Brazil); E. peruviana (Chambireyacu, near Yurimaguas, Peru); E. ucayali (Contamana, R. Ucayali, Peru); E. cavallo cavallo (Cavallo-Cacho, Peru); E. c. burityensis (Burity, 30 mi. NE of Cuyaba, Matto Grosso, Brazil); E. c. zoyga (Viannopolis, Goyaz, Brazil); E. melarroys (Rio Negro, Colombia); E. teffe (Teffe, Brazil); E. guenéei ("Cayenne", Fr. Guiana); E. batesi (Humayta, Brazil); E. charassomena (Teffe, Brazil); E. roraima (Roraima, Br. Guiana); E. rosenbergi (Paramba, Ecuador); E. melaphleba (Chanchamayo, Peru); E. hoplochares (St. Paulo d'Olivença, Brazil); E. pelocraspeda pelocraspeda (R. Caqueta, Colombia); E. p. mossi (Santarem, Brazil); E. fumicosta (Cubulco, Vera Paz, Guatemala); E. copharpe (Espiritu Santo, Brazil); E. lyra (R. Cayapas, Ecuador); E. orosi orosi (Orosi Vulcan, Irazu, Costa Rica); E. o. borealis (La Cambre, Honduras); proposes E. walkeri for E. festiva Wlk. (nec Cramer). Figures ♂ genitalia of most spp., both old and new. Gives keys to spp. and species groups. [P.B.]

98. Diakonoff, A., "The type specimens of certain Oriental Eucosmidae and Carposinidae (Microlepidoptera) described by Edward Meyrick, together with descriptions of new Eucosmidae and Carposinidae in the British Museum (Natural History)." Bull. Brit. Mus. (Nat. Hist.), Ent., vol.1: pp.275-300, 6 pls., 2 figs. Sept. 1950. Describes as new: (Eucosmidae) Acroclita argyrophenga (Khasi Hills, Assam); A. falcigera (Kegalle, Ceylon; Dibidi, N. Coorg); A. lithoxoa (Pusa, Bengal); Bactra coronata (Bandong, Java); B. monochorda (Maskeliya, Ceylon); (Carposinidae) Meridarchis drachmophora (Mt. Goliath, Dutch New Guinea); M. dryas (Mao, N. Manipur; Kohima, Naga Hills); M. ensifera (Tanglo, Sikkim); M. rodea (Snow Mts., Upper Setekwa R., Dutch New Guinea; Owgarra, Brit. New Guinea); Picrorrhyncha atribasis (Dharmsala, Punjab). Type localities not specified. Genitalia not described, except for Bactra spp.; this is a fault for which the author criticizes Meyrick! Lists types for Meyrick's spp. of 15 genera of Eucosmidae and 7 of Carposinidae; many of these are lectotypes selected by the author. Synonymizes many spp. Describes and figures ♂ genitalia of Bactra, Lobesia and Parabactra spp., and discusses structure of Lobesia. See review in Lep. News, vol.5: p. 61. [P.B.]

99. Hemming, A. F., and L. A. Berger, "Nouvelles règles de nomenclature. Application au cas Colias hyale et Colias australis" [In French]. Lambillionea, vol.50: pp.2-9. 25 Feb. 1950. Reviews the decisions of the International Commission, to the following effect: the rules of priority are made applicable to names of infra-subspecific rank; such names, however, have no priority or validity as specific or subspecific names unless elevated to such rank by a later author; in the latter case, the authority for the names is the author elevating them, and the date, for purposes of priority, is the date of publication of such elevation; names applied to populations are to be considered as of specific or subspecific rank, and all others as of infra-subspecific rank, except that names published before July 1948 are to be considered as of the higher rank unless the original description clearly indicates the contrary (i.e. a name applied to an individual aberration is to be considered infra-subspecific). This badly-needed revision and clarification of the rules relieves the taxonomist of the necessity of considering the host of aberrational names in questions of priority. According to the new rules the correct name for the recently discovered sibling species, long confused with C. hyale, is C. australis Verity 1911, since alfacariensis, used by Berger in 1945 when the species was first recognized, was published by Ribbe as an aberrational name (in 1905) and has priority on the specific level only as of Berger's publication. [P.B.]

RECENT LITERATURE ON LEPIDOPTERA - cont.

100. Herbulot, C., "Diagnoses de nouveaux genres de Geometridae Larentiinae" [In French]. Rev. Franç. Lépid., vol.13: pp.25-26. "Jan-Feb." [31 Mar.] 1951. Describes as new the following genera (with type spp.): DYSRHOE (Ortholitha rhiogyra Prout); CATARHOE (Cidaria basochesiata Duponchel); GLAUCORHOE (Cabera unduliferaria Motschulsky); ARCHIRHOE (Hydriomena neomexicana Hulst). [P.B.]

101. Herbulot, C., "Un nouvel Epirrhoe d'Amérique du Nord" [In French]. Rev. Franç. Lépid., vol.13: pp. 26-27. "Jan.-Feb." [31 Mar.] 1951. Describes as new E. sperryi (Lloydminster, Saskatchewan); species is misidentified as E. tristata in American lists.[P.B.]

102. Kapur, A. P., "The identity of some Crambinae associated with sugar cane in India and of certain species related to them (Lepidoptera: Pyralidae)." Trans. R. Ent. Soc. Lond., vol.101: pp.389-434, 10 pls. 30 Dec. 1950. Describes as new: Chilo tamsi (Peermade, Travancore); CHILOTRAEA (type Chilo infuscatellus Snellen); C. bandra (Bandra, Bombay); DRASA (type Diatraea cashmirensis Hampson); Proceras indicus (Pusa, Bihar); BISSETIA (type Chilo steniellus Hampson); Coniesta hampsoni (Nilgiri Hills); C. belgaumensis (Belgaum); GIRDHARIA, G. tauromma (Kangra Valley, Punjab). Revision covers all Indian species of the above genera and of Stenochilo. Keys to the genera and spp. List of extralimital, misidentified or insufficiently known species which are excluded. Figures of genitalia of all, and of adults and structural details of some species. [P.B.]

103. Kiriakoff, S. G., "Sur la classification et la phylogenie de la superfamille Notodontoidea (F. d'Almeida) Kiriakoff" [In French]. Bull. Ann. Soc. Ent. Belg., vol.86: pp.236-255. 28 Dec. 1950. Recognizes the following families, subfamilies and tribes: Dioptidae: Dioptinae, Josiinae; Notodontidae: Tarsolepidinae, Notodontinae (Notodontini, Pygaerini, Gluphisiini); Thyretidae. The Thaumatopoeidae are placed in the Notodontini. Separation from the Phalaenoidea and classification within the superfamily is based mainly on the structure of the tympanum. The Dioptinae are regarded as nearest to the common ancestry of the superfamily; the Thyretidae are a late offshoot. The group is presumed to have had a neotropical origin, and a Wegenerian account of its subsequent dispersion is given. [P.B.]

104. Klots, Alexander B., "Notes on the genus Eurema (Pieridae) in the United States." Lep. News, vol.2: pp.51-52. May 1948.

105. de Lattin, Gustav, "Türkische Lepidopteren. II." [In German, Turkish abstract]. Istanbul Univ. Fen Fakult. Mecmuasi, series B, vol.16: pp.45-73, 1 pl., 8 figs. 1951. Describes as new: Criphia rubellina sabulicolor (Agrotidae; Gaziayntep, Turkey); Agrochola helvola vulpina (Agrotidae; Bevek, Turkey); Cidaria variata balcanicola (Geometridae; Bebek); Endotricha flammealis carnealis (Pyralidae; Bebek). Lists 239 spp., belonging to 16 families of Heterocera, with localities; comments on some variable or confusing spp., with figures of ♂ genitalia and tables for separation of 8 closely related pairs. Figures adults of new sspp. and several others. [P.B.]

106. Munroe, Eugene G., "The genus Junonia in the West Indies (Lepidoptera, Nymphalidae)." Amer. Mus. Nov., no.1498: 16 pp. 3 Apr. 1951. Describes as new J. evarete michaelisi (Coamo Springs, Puerto Rico). General discussion of this confusing genus: includes all West Indian forms in coenia (1 ssp.) and evarete (= lavinia) (3 ssp.), and regards zonalis and genoveva as "wet" and "dry" season forms of evarete. [P.B.]

107. Toxopeus, L. J., "On the collecting localities of some Linnean types (Lep. Rhopalocera)." Idea, vol.8: pp.53-74, 1 pl., 1 fig. 31 Jan. 1951. On account of old sources and nautical maps fixes localities of Linnean types of Papilio sarpedon, P. ascanius, P. java, and P. candida, and reconsiders subspecific relations within some of these species, thus: P. (Graphium) sarpedon lycianus n. n. for P. s. sarpedon auctt. not L.; P. (G.) sarpedon corbeti n. n. for P. s. sarpedon auctt. not L. (= P. s. melas Fruhst.), with gemmatus f. n. the dry season form; P. (Atropha-neura) ascanius L. (1768) for P. antiphus F. (1893); and P. neascanius n. n. for P. ascanius Cram. (1775) from Brazil; Anaphaeis java java (L.) is the subsp. from Noord Island (topotype), S. Sumatra, and Java. Pieris candida candida (L.) is introduced in Noord Island from Canton; its synonyms are P. glyceria (Cram.) and P. c. malayica (Mart.). [A.D.]

108. Travassos, Lauro, "Contribução ao conhecimento dos "Arctiidae". XXIII. Gênero Purius Walker, 1855" [In Portuguese]. Rev. Brasil. Biol., vol.11: pp.43-47, 11 figs. Feb. 1951. Detailed description of P. pilumnia ♂; ♀ unknown to author. [P.B.]

109. Travassos, Lauro, "Contribução ao conhecimento dos "Arctiidae". XXIV. Sôbre o gênero Evius Walker, 1855" [In Portuguese]. Rev. Brasil. Biol., vol.11: pp.181-187, 17 figs. June 1951. Detailed description of generic characters and of E. hippia. [P.B.]

110. Varin, G., "Contribution à l'étude des races des Satyridae de France et du Nord de l'Afrique" [In French]. Rev. Franç. Lepid., vol.11: pp.395-398; vol.12: pp.9-15, 341-347. "Oct.-Nov." [16 Dec.] 1948; "Jan." [28 Feb.] 1949; "Nov.-Dec. 1950" [8 May 1951]. Survey of Melanargia races. Describes as new: M. galathea xantonica (Deux-Sevres, etc., France); M. g. vocontia (Hautes-Alpes); M. g. paludosa (Marais d'Aigues-Mortes, Gard, France); M. syllius moghrebiana (Morocco); M. japygia caussica (Gard, etc., France). No type localities given. Discusses geographical variation of these spp. and M. lachesis. [P.B.]

111. Viette, P., "Contribution à l'étude des Hepialidae (12e note). Genres et synonymie" [In French]. Lambillionea, vol.49: pp.101-104. 25 Oct. 1949. Considers valid the following genera (with spp. included): Phimatopus Wallengren (hecta L., hectoides Bdv., behrensis Stretch, sequoiolus Behr); Korscheltellus C. B., subg. Korscheltellus (lupulinus L.), Gazoryctra Hbn. (ganna Hbn., macilentus Ev., confusus Hy. Edw., macglashani Hy. Edw.) and Pharmacis Hbn. (carna Esp., bertrandi Le Cerf, pyrenaicus Donz., castillanus Obth., armoricanus Obth.); Triodia Hbn. (sylvinus L., laetus Stgr., amasinus H. S., nubifer Led.). Synonymizes Hepialus okninskyi under Korscheltellus fusconebulosus, and lists sspp. of latter. Transfers niphonica Btlr. to Palpifer. [P.B.]

112. Viette, P., "Supplément au Catalogue des Lépidoptères Hétérocères de l'Océanie française" [In French]. Bull. Soc. Ent. France, vol.56: pp.14-16. Jan. 1951. Describes as new: Asota caricae melanensis (Hypsinae; Efate Is., New Hebrides). Lists 35 spp., belonging to 10 families, omitted from the previous list (abstract in Lep. News, vol.3: 298). [P.B.]

113. Viette, P., "Les types de Tineides de Constant" [In French]. Rev. Franç. Lépid., vol.12: pp.337-341. "Nov.-Dec. 1950" [8 May 1951]. Selects lectotypes for 44 spp. (Lyonetiidae, Lithocolletidae, Coleophoridae, Elachistidae, Scythrididae, Oecophoridae, Cosmopterygidae, Gelechiidae) from specimens of Constant's original series: all in Paris museum. [P.B.]

C. Morphology

114. Barth, Rudolf, "Das Duftorgan von Pantherodes pardalaria (Hbn., 1823) (Geometridae, Geometrinae)" [In German, Portuguese abstract]. Rev. Brasil. Biol., vol.11: pp.105-118, 12 figs. Feb. 1951. Morphological description of the scent organs of the ♂ hind tibia in this species. [P.B.]

115. Bödewadt, Geert Hinrich, "Untersuchungen über das Zellteilungsgeschehen in der Entwicklung der Flügelanlagen von Kleinschmetterling" [In German]. Biol. Zbl., vol.70: pp.31-64, 4 figs. 1951. Investigation of the mechanism of wing development in Ephestia and Galleria by a study of cell division in the wing primordium. [P.B.]

116. Dunk, H. C., "A gynandrous Ochlodes venata." Entomologist, vol.84: p.93. Apr. 1951.

117. Harrison, J. W. Heslop, "A hybrid between Pieris napi male and P. rapae female (Lep. Pieridae)." Entomologist, vol.84: pp.99-101. May 1951. Description of all stages of a series of specimens. Adults structurally sterile ♂♂; patterned like intersexes. [P.B.]

118. Henke, K., "Über Ordnungsvorgänge in der Spätentwicklung der Insekten" [In German]. Rev. Suisse Zool., vol.55: pp.319-337. 1948. Discussion of the development of wing pattern in Ephestia kühniella. [P.B.]

119. Jorg, M. E., "Un organo de especial diferenciacion anatomomicroscopico en la oruga de Morpho catenarius argentinus (Lep. Rhop. Morphidae)" [In Spanish, English abstract]. Acta Zool. Lilloana, vol.5: pp.131-136, 1 pl., 2 figs. 28 Oct. 1948. Morphology and histology of an eversible glandular structure found ventrally on the prothorax of the full-grown larva. [P.B.]

120. Mukerji, S., and Hukam Singh, "Studies on the chaetotaxy of larvae of Plusia species (Lepidoptera: Phalaenidae). Proc. R. Ent. Soc. Lond. (B), vol.20: pp.15-24, 3 pl. 20 Feb. 1951. Describes setal arrangement on the head and body of reared last instar larvae of three species. [P.B.]

121. Newman, L. Hugh, "A gynandromorph Lysandra bellargus from the Folkestone Hills." Entomologist, vol. 84: pp.185-186. Aug. 1951.

122. Parsons, R. E., "Gynandromorph Pieris napi." Entomologist, vol.84: p.70. Mar. 1951.

123. Rempel, J. G., "A study of the embryology of Mamestra configurata (Walker) (Lepidoptera, Phalaenidae)." Canad. Ent., vol.83: pp.1-19, 6 pls., 2 figs. Jan. 1951. Detailed description of development to end of egg stage, with good figures. [P.B.]

124. Seiler, J., "Analyse des intersexen Fühlers von Solenobia triquetrella (Psychidae, Lepid.)" [In German]. Rev. Suisse Zool., vol.58: pp.489-495, 2 figs. June 1951. Antennae of intersexes are intermediate only in being part ♂ and part ♀, each individual part is entirely of one sex, not transitional. [P.B.]

125. Viette, P., "Contribution à l'étude des Hepialidae (14me note). Les pièces buccales" [In French]. Bull. Mens. Soc. Linn. Lyon, vol.18: pp.206-207, 4 figs. Dec. 1949. Shows that 'postantennae' and 'mandibles' figured in Zenophassus schamyli by Tindale are only pilifers and part of maxilla. Figures mouth parts of Zenophassus (well developed) and 2 other genera (progressively reduced). Subfamily Zenophassinae not valid on basis of structure of mouth parts. [P.B.]

126. Way, M. J., "The structure and development of the larval cuticle of Diataraxea oleracea (Lepidoptera)." Quart. Journ. Micr. Sci., vol.91: pp.145-182, 3 pls. 5 figs. June 1950. A very thorough study, covering chemistry of the cuticle and moulting phenomena as well as histology. [P.B.]

D. Variation and Genetics

127. Cockayne, E. A., "Abraxas grossulariata L. ab. aureomarginata ab. nov. (Lep. Geometridae)." Entomologist, vol.84: pp.128-131, 1 pl. June 1951. Figures reared series of this aberration; its genetics were not worked out because of loss of the stock. [P.B.]

128. Collier, A. E., "A Note on the genetics of Pararge megera ab. excessa." Entomologist, vol.84: pp.56-57. March 1951. Inconclusive breeding experiments. [P.B.]

129. Goodson, A. L., "New varieties of British butterflies." Entomologist, vol.84: p.30. Feb. 1951. Two aberrations named. [P.B.]

130. Kiriakoff, Sergius G., "Ecological races in Lepidoptera." Lep. News, vol.2: p.39. Apr. 1948.

131. Leeds, H. A., "British aberrations of the Gatekeeper Butterfly, Maniola tithonus (Linnaeus 1771); Meadow Brown Butterfly, Maniola jurtina (Linnaeus 1758); and the Small Heath Butterfly, Coenonympha pamphilus (Linnaeus 1758)." Proc. Trans. South Lond. Ent. Nat. Hist. Soc., 1948-1949: pp.80-122b, 3 pls.; 1949-50: pp.81-82, postscript. Feb. 1950, Apr. 1951. Describes all known aberrations of these three spp.; figures 56 specimens in color. Aberrations are named according to a standard system of Latin names which appears to cover most variation in these spp. and some related ones, but which is somewhat clumsy (e.g, ab. postquadriexcessa) and not generally applicable. Genetic information is regrettably absent. [P.B.]

132. Lempke, B. J., "Catalogus der Nederlandse Macrolepidoptera, IX" [In Dutch]. Tidjschr. Ent., vol.92: pp.113-218, 15 figs. "1949" [1950], This part contains Geometridae (continued). Numerous new forms described (descriptions and more important discussions translated in English in footnotes). [A.D.]

133. Lenek, Oskar, "Über eine Zucht von Boarmia gemmaria Brahm forma rebeli Aigner" [In German]. Ent. Nachrichtenbl., vol.3: pp.121-124, 8 figs. May 1951. Breeding experiments with a melanic mutant. Redescribes 'form' and names several new ones. [P.B.]

134. Loberbauer, Rud., "Rhyacia margaritacea. Vill., ihre Biologie und ihre Variationsbreite" [In German]. Ent. Nachrichtenbl., vol.3: pp.128-130. May 1951. Habits and variation; names 3 'forms'. [P.B.]

135. Loritz, Jeannine, "Une curieuse aberration de Polyommatus escheri Hb." [In French]. Rev. Franç. Lépid., vol.11: p. 364. Sept. 1948. Names a melanic aberration. [P.B.]

136. Sargeaunt, W. T., "Lycaena phlaeas ab. schmidtii." Entomologist, vol.84: p.21. Jan. 1951. Records specimen with aberrant marking on one fore wing only. [P.B.]

137. Sevastopulo, D. G., "The genetics of East African Lepidoptera. II." Entomologist, vol.83: pp.256-258. Nov. 1950. Describes and names a simple recessive mutant in Orgyia basalis. [P.B.]

138. Neschner, Emil, "Einige auffällige Pieris napiform" [In German]. Ent. Nachrichtenbl., vol.3: p. 108. Feb. 1951. Names a 'form'. [P.B.]

139. Thompson, J. Antony, "A new form of Pieris napi L." Entomologist, vol.84: p.177. Aug. 1951. Names an aberration, probably genetic. [P.B.]

140. de la Torre y Callejas, Salvador Luis, "Sobre una nueva forma de Nathalis iole Boisduval (Lepidoptera. Pieridae)" [In Spanish]. Mem. Soc. Cubana Hist. Nat., vol.20: pp.89-91, 1 pl. June 1951. Describes and names a seasonal form. [P.B.]

141. Varin, G., "Quelques aberrations de Melanargia galathea L. de la région parisienne" [In French]. Rev. Franc. Lépid., vol.11: pp.356-359, 1 pl. Sept. 1948. Describes and figures 8 named aberrations; 2 are new. [P.B.]

RECENT LITERATURE ON LEPIDOPTERA - cont.

E. Distribution and Phenology

142. Bowman, Kenneth, "An annotated list of the Lepidoptera of Alberta." Canad. Journ. Zool., vol.29: pp. 121-164, 1 map. Apr. 1951. Discusses ecological areas in the province; lists 1825 forms. [P.B.]

143. Daltry, H. W., "Entomology." Trans. Ann. Rep. N. Staffs. Field Club, vol.81: pp.104-110; vol.82: pp. 130-137; vol.83: pp.83-87. 1947-1949. List of spp. collected. [P.B.]

144. Kaisila, Jouko, "Ancylis partitana Chr. (Lep., Tortricidae), neu für die Fauna Europas, in Finnland gefunden" [In German]. Ann. Ent. Fennici, vol.13: pp.1-5, 4 figs. 31 Mar. 1947. Figures adult and ♂ genitalia and distinguishes sp. from A. comptana. [P.B.]

145. Kaisila, Juoko, "Einige Theorien über die Entwicklung der europäischen Schmetterlingsfauna" [In Finnish, German summary]. Ann. Ent. Fennici, vol.13: pp.11-16, 1 map. 31 Mar. 1947. Summary of theories of the development of the modern distribution of Lepidoptera in Europe. [P.B.]

146. Lichy, René, "Documents pour servir à l'étude des Sphingidae du Venezuela (Lepid., Heter.) (9e note)" [In French]. Bol. Ent. Venezolana, vol.7: pp.67-89, 2 pls., 1 map. Dec. 1948. Discusses similarity of fauna with that of upper Amazon. Redescribes and figures Phlegethontius leucospila and Eupyrrhoglossum venustum and lists 4 other spp, all new to Venezuela; notes on 48 other spp. [P.B.]

147. MacNay, C. Graham, "A summary of the more important insect infestations and occurrences in Canada in 1947." 78th Ann. Rep. Ent. Soc. Ontario: pp.71-89. 1948.

148. MacNay, C. Graham, "A summary of the more important insect infestations and occurrences in Canada in 1948." 79th Ann. Rep. Ent. Soc. Ontario: pp.66-87. 1949.

149. MacNay, C. Graham, "A summary of the more important insect infestations and occurrences in Canada in 1949." 80th Ann. Rep. Ent. Soc. Ontario: pp.57-77. 1950.

150. Peltonen, Osmo, "Zur Schmettersfauna von Viena" [In Finnish, German summary]. Ann. Ent. Fennici, vol.13: pp.131-144, 1 map. 29 Oct. 1947. Annotated list, covering all families. [P.B.]

151. Skogsborg, Jan, "Depressaria impurella Tr. (Lep. Tin.) ny för Sverige" [In Swedish, English summary]. Ent. Tidskr., vol.72: pp.75-76. 15 Apr. 1951. New Swedish record. [P.B.]

152. Valletta, Anthony, "Additions to the list of Lepidoptera, Heterocera, of the Maltese Islands." Entomologist, vol.84: pp.64-66. Mar. 1951. Includes 7 Noctuidae, 2 Geometridae, 9 Pyralidae, 4 Tortricidae, 3 Gelechiidae, 1 Tineidae, 1 Monopidae, 1 Tischeriidae. [P.B.]

153. Various authors, in Ann. Rep. For. Ins. Surv., Dept. Agr. Canada, 1946 [1947], 1947 [1948], 1948 [1949], 1949 [1950], 1950 [1951]. This series contains a great deal of information on distribution, outbreaks, and fluctuation in numbers of economically important insects, including Lepidoptera. [P.B.]

154. Various authors, "Field season summary of Lepidoptera - 1947 season." Lep. News, vol.1: pp.88-96. Dec. 1947.

155. Wojtusiak, Roman J., and Halina Wojtusiak, "Contributions to the knowledge of the lepidopterological fauna of Eastern Lithuania" [In Polish, English summary]. Fragm. Faun. Mus. Zool. Polon., vol.5: pp. 159-183, 1 fig. 18 Dec. 1947. Brief ecological description of area studied, and an annotated list of 299 spp. collected. [P.B.]

F. Biology

156. Callan, Edward McC., "A note on Sarcophaga lambens (Wied.), a parasite of the South American Bollworm, Sacadodes pyralis Dyar." Revista Ent., vol.17: pp. 474-475. "Dec. 1946" [20 Jan. 1947]. Records several other lepidopterous hosts. [P.B.]

157. Freiberg, Marcos A., "La oruga de la alfalfa en la Argentina, Colias lesbia (Fabricius) (Lep. Pier.)" [In Spanish]. Inst. Sanid. Veg. Argentina, ser.A, no.36: 29 pp., 17 figs. 1947. Redescribes sp.; describes and figures ♂ genitalia, adult (several series from different localities), larva, and pupa. Discusses biology, parasites, taxonomic history, and economic importance. [P.B.]

158. Griot, Mario, and Amelia Icart, "Observaciones sobre Allocota bruchi Bréthes, parasito del "bicho de cesto" [In Spanish]. Inst. Sanid. Veg. Argentina, ser.A, no.31: 14 pp., 12 figs. 1947. External parasite apparently restricted to Oiketicus kirbyi. Description of early stages and host relations. [P.B.]

159. Griot, Mario, and Amelia Icart, "Observaciones sobre un parasito del "bicho de cesto", Psychidosmicra brasiliensis (Brethes)" [In Spanish]. Inst. Sanid. Veg. Argentina, ser.A, no.36: 13 pp., 10 figs. 1947. Life history and biology of this parasite of Oiketicus kirbyi. [P.B.]

160. Kanervo, Veikko, "Über das Massenauftreten der Gammaeule, Plusia gamma L. (Lep., Noctuidae), im Sommer 1946 in Finland" [In German]. Ann. Ent. Fennici, vol.13: pp.89-104, 5 figs., 2 maps. 29 Oct. 1947. Discusses distribution and development of outbreak; lists plants attacked and parasites. [P.B.]

161. Kaussari, M. "Earias insulana Boisd." [In French]. Ent. Phytopath. Appl., Iran, no.4: pp.12-14. June 1947. Summary of a paper in Persian on the morphology, biology and control of this noctuid pest of cotton. [P.B.]

162. Keifer, H. H. "Systematic entomology." Bull. Calif. Dept. Agr., vol.36: pp.168-172. 1947. Habits of Myelois venipars, Argyrotaenia citrana, Apterona crenulella. [P.B.]

163. Pohjola, Mauno U., "Orgyia antiqua L. (Lep., Lymantriidae) als Heidelbeerschädling" [In Finnish, German summary]. Ann. Ent. Fennici, vol.13: pp.22-23. 31 Mar. 1947. Account of an outbreak on Vaccinium. [P.B.]

164. Rauhala, Aarre, "Über ein Massenauftreten von Colias hyale L. (Lep., Pieridae) in Helsinki im Spätsommer 1942" [In Finnish, German summary]. Ann. Ent. Fennici, vol.13: pp.23-24. 31 Mar. 1947.

165. Soenen, Alb., "Contribution à l'étude du Carpocapse" [In French]. Parasitica, vol.3: pp.82-91. 1947. Control of C. pomonella, with notes on biology. [P.B.]

166. Spencer, G. J., "On the oviposition habits of Dargida procincta (Lepidoptera: Phalaenidae)." Proc. Ent. Soc. Br. Columbia, vol.43: p.10. 4 Feb. 1947.

167. Steyaert, R. L., "Quelques données sur la biologie de la Pyrale du Caféier Dichocrocis (Conogethes) crocodora Meyr" [In French]. Parasitica, vol.3: pp.129-130. 1947. Habits and control. Lists 1 parasite. [P.B.]

168. Walton, W. R., and C. M. Packard, "The Armyworm and its control." U. S. Dept. Agric. Farmers' Bull., no.1850: 10 pp., 7 figs., 1 map. Oct. 1947. Distribution, biology, parasites and control of Cirphis unipuncta. [P.B.]

169. Williams, Evelyn Gilstrap, "Butterflies and moths." School Nature League Bull., ser.18, no.1: 4 pp., 7 figs. Sept. 1947. Popular account of biology of Lepidoptera. [P.B.]

G. Physiology and Behaviour

170. Agrell, Ivar, "The diapause problem." Année Biol., vol.55: pp.287-295, 3 figs. Apr. 1951. Summary of some recent work in diapause in Lepidoptera and other insects. [P.B.]

171. Bounhiol, Jean-Jacques, "Voltinisme expérimental (suppression de la diapause) imposé à plusieurs générations successives de Bombyx mori L." [In French]. C. R. Acad. Sci., vol.232: pp.2360-2362. 18 June 1951. Diapause not essential for vitality of stock. [P.B.]

172. Drilhon, Andrée, and René-Guy Busnel, "Les acides aminés libres et les substances fluorescentes du sang et du tube de Malpighi de la chenille de Bombyx mori L." [In French]. C. R. Acad. Sci., vol.232: pp.182-184. 8 Jan. 1951. Chromatographic analyses of silkworm larvae. [P.B.]

173. Drilhon, Andrée, René-Guy Busnel, and Constantin Vago, "Les acides aminés libres et les substances fluorescentes du sang, et des tubes de Malpighi, de la chenille de Bombyx mori L., atteinte de la maladie à polyèdres et de la flacherie" [In French]. C. R. Acad. Sci., vol.232: pp.360-361. 22 Jan. 1951. The very different effects of these two diseases on the blood constituents are recorded. [P.B.]

174. Shteinberg, D. M., "Gormony u nasekomykh" [In Russian; Hormones in insects]. Uspekhi Sovremmenoi Biologii, vol.25: pp.401-418. 1948.

175. Szekessy, V., "Zusammenhang zwischen Funktion und Querstreifung beim Insektenmuskel" [In German]. Ann. Hist.-Nat. Mus. Nat. Hungarici, vol.40: pp.89-96, 2 figs. 1947. Number of striations in insect muscle is not species-specific, but depends on frequency of contraction and work done by the muscle. Some of the work was done on Sphinx. [P.B.]

H. Migration

176. Beebe, William, "Migration of Danaidae, Ithomiidae, Acraeidae and Heliconiidae (butterflies) at Rancho Grande, north-central Venezuela." Zoologica, vol.35: pp.57-68, 1 fig. 17 Apr. 1950. Records of migration for 3 Danaidae, 31 Ithomiidae, 2 Acraeidae, and 19 Heliconiidae. [P.B.]

177. Beebe, William, "Migration of Pieridae (butterflies) through Portachuelo Pass, Rancho Grande, north-central Venezuela." Zoologica, vol.35: pp.189-196, 1 pl. 27 Nov. 1950. Records of 44 spp. Figures all; gives species range and field characters. [P.B.]

178. Beebe, William, "Migration of Nymphalidae (Nymphalinae), Brassolidae, Morphidae, Libytheidae, Satyridae, Riodinidae, Lycaenidae and Hesperiidae (butterflies) through Portachuelo Pass, Rancho Grande, north-central Venezuela." Zoologica, vol.36: pp.1-16, 2 pls. 20 Apr. 1951. Records 55 Nymphalinae, 4 Brassolidae, 1 Morpho, 1 Libytheana, 12 Riodinidae (all are figured); 14 Satyridae, 12 Lycaenidae, 41 Hesperiidae. Gives species range, and field characters of most. [P.B.]

179. Campbell, J. L., "An experiment in marking migratory butterflies." Entomologist, vol.84: pp.1-6. Jan. 1951. 300 Vanessa cardui and 100 V. atalanta marked and released; 4 recaptures. [P.B.]

180. Erkamo, V., "Pyrameis (Lep., Nymphalidae) -Beobachtungen im Sommer 1946" [In German]. Ann. Ent. Fennici, vol.13: pp.8-11. 31 Mar. 1947. Data on migration in Finland. [P.B.]

181. Speyer, W., "Die Wandergewohnheiten und der Flug des grossen Kohlweisslings (Pieris brassicae L.)" [In German]. Zeits. Pflanzenkrank. Pflanzenschutz, vol. 55: pp.335-341. 1948. Data on migration in Germany; this species seems to have regular north and south migrations like those of the Monarch. [P.B.]

I. Technique

182. Ackermann, Otto, "Plastic mounts for butterfly and moth collections." Lep. News, vol.2: p.31. Mar. 1948.

183. Agenjo, R., "Posibilidad de determinar lepidopteros en estado de pupa, mediante estudio de los aparates genitales" [In Spanish, German summary]. Proc. VIII Int. Ent. Congr., pp.530-534, 2 figs. 1950. Points out that genitalia, in some spp. at least, are well developed and typical in the pupal stage and will serve for identification. [P.B.]

184. Bauer, David L., "Methods for collecting Buck-moths (Hemileuca, Saturniidae)." Lep. News, vol.2: pp.81-82. Oct. 1948.

185. Fletcher, Frank C., "Papering insects in the field." Ward's Nat. Sci. Bull., vol.21: pp.51-53, 1 fig. Mar. 1948.

186. dos Passos, Cyril F., "The photography of types of Lepidoptera." Lep. News, vol.3: pp.41-42. "Apr.-May" [July] 1949.

187. Richard, F., "Chasseurs d'autrefois et d'aujourdhui" [In French]. Lambillionea, vol.49: pp.35-38, 54-56, 81-84. 25 Apr., 25 June, 25 Aug. 1949. Remarks on old and modern collecting equipment and methods. [P.B.]

188. Taschenberg, E. F., "Laboratory rearing of Grape Berry Moth." Journ. Econ. Ent., vol.44: pp.256-258, 1 fig. Apr. 1951. Polychrosis viteana. [P.B.]

189. Townes, Henry, "A cabinet for Schmidt boxes." Coleop. Bull., vol.5: pp.21-27, 1 fig. Apr. 1951. Complete instructions for building such a cabinet; cost about $13. [P.B.]

190. Wilde, W. H. A., "A bivalve type of insect feeding cage." Canad. Ent., vol.83: pp.206-208, 3 figs. Aug. 1951. Describes and figures an improved cage for confining insects on the food plant. [P.B.]

J. Miscellaneous

191. Abbot, John, "Notes on my life." Lep. News, vol. 2: pp.28-30. "Mar." [June] 1948.

192. Diakonoff, A., "A short report on the damage caused to lepidopterology during and after the Pacific war in Java and Malaya." Lep. News, vol.2: p.79. Oct. 1948.

193. Kiriakoff, Sergius G., "A report on the war damage to lepidopterology in Europe." Lep. News, vol.2: pp. 49, 61, 80; vol.3: p.4. May, June, Oct. 1948; June 1949.

194. Lempke, B. J., "Rebel's edition of Berge's Schmetterlingsbuch." Journ. Soc. Bibl. Nat. Hist., vol.2: pp.171-172. Sept. 1949. Information on the dates of publication of the fascicles. [P.B.]

195. Muesebeck, C. F. W., "Common names of insects approved by the American Association of Economic Entomologists." Journ. Econ. Ent., vol.43: pp.117-138.1950.

196. Suomalainen, Esko, "Zur Ausbreitung der Schmetterlinge durch die Eisenbahn" [In German]. Ann. Ent. Fennici, vol. 13: p.182, 1 map. "31 Dec. 1947." 1948. Notes on the spread of Calotaenia celsia and Procus bicolorius in Finland by railway. [P.B.]

197. Toxopeus, L. J., "Vlinders van de Minahassa in Noord-Celebes" [In Dutch]. Idea, vol.8: pp.100-101. 31 Jan. 1951. Note on the important collection of P. Zondervan, saved and preserved during Japanese occupation of N. Celebes. [A.D.]

198. Twinn, C. R., "The Lepidoptera in fact and in poetry: part II - the moths." Pesta, vol.15, no.5: pp.24-30. May 1947. References to moths and caterpillars in Shakespeare, etc. [P.B.]

199. Webb, Damian, "A moth like a hummingbird." Country Life, vol.102: pp.876-877, 6 figs. 31 Oct. 1947. Macroglossum, beautifully figured. [P.B.]

NOTICES

Lepidopterists' Society members may use this page free of charge to advertise their offerings and needs in Lepidoptera. The Editors reserve the right to rewrite notices for clarity or reject unsuitable notices. Unless withdrawn sooner by the member, each notice will appear in three numbers. We can not guarantee any notices but expect all to be bona fide. Please notify us of any abuse of this service.

The Abellana High School Lepidopteran Club, Cebu City, Cebu, PHILIPPINES, wishes to exchange Cebu butterflies for species from all other parts of the world. Collectors interested in exchanging should write directly to the Club.

Rarities from Spain: Erebia palarica, E. zapeteri, Lycaena idas and ssp. chapmani, L. dolus ssp., Coenonympha leander iphioides, Lysandra corydon caelestissima, L. albicans, etc. Also many rare endemic spp. from Atlas Mts. of Morocco, Argynnis lyauteyi, A. auresiana, Lycaena bavius fatma and many others. Will sell, or exchange for better Palaearctic and Nearctic Rhopalccera only, preferably Alpine and Arctic spp. Colin W. Wyatt, Cobbetts, Farnham, Surrey, ENGLAND.

Tropical butterflies wanted for art work for cash or exchange. Write what you have, quantity, and price in first letter. Anton Jelinek, 3900 Diversey Ave., Chicago 47, Ill.

Wish to get in contact with companies or individuals who desire butterflies for art work. Taking orders for 1952. M. Eugene Smith, Newnan, Georgia.

Wanted: tropical butterflies and moths, papered or pinned. Private collections wanted from all parts of the world. Will pay cash. Ben Karp, 3148 Foothill Blvd., La Crescenta, Calif.

Megathymus wanted - specimens of this genus from all localities. Will buy or exchange. Have Megathymus for exchanges.
Don B. Stallings, Caldwell, Kansas.

Exchange desired in all groups of Macros, esp. Geometridae. Lepidoptera from Colorado (Parnassius, Colias, Oeneis, etc.), Illinois, and southern Indiana offered in trade. Ronald H. Leuschner, 1172 S. Wenonah Ave., Oak Park, Illinois.

Japanese Rhopalocera and some moths, including Japanese (and including Formosan) Rhopalocera and some moths offered in exchange for Rhop. and some moths from all parts of the world. Especially Satyridae, Lycaenidae, Papilionidae, Nymphalidae, Pieridae, Saturniidae and Arctiidae. Seiji Ishida, 33 Nakayama-cho, Saga, Ukyo-ku, Kyoto City, JAPAN.

Huge African Lepidoptera collection for sale; over 2000 moths and 5400 butterflies. About 250 types, with complete data, all on pins. Will sell in part or complete, including 120 glass cases. Also, rare books on African Lepidoptera. Ari W. Kampf, Franz Jurgens Strasse 12, Dusseldorf, GERMANY.

Australian Lepidoptera for sale, papered or pinned, perfect specimens, with data, 10¢ each. Write stating needs; Victorian species only offered. Ian Harman, c/o Mrs. A.H. Bisdee, Appletree Cottage, Dorset Road, Croydon, Victoria, AUSTRALIA.

I will pay Lepidopterists' Society dues for foreign (or N. American) collectors in exchange for shipment of butterflies of equal value, or will pay cash direct. Want butterflies from any tropical island, Africa, and Indo-Australia, Central and South America; NOT Europe at present. Also want North American species in quantity, esp. Papilio. Must be first quality, in papers. Want all families but esp. Nymphalidae, Papilionidae, Morphidae, and Saturniid moths; also other large insects. Will advance money to any good collector. Send list and prices in first letter. A. Glanz, Butterfly World Supply House, 289 E. 98th St., Brooklyn 12, New York.

Wanted to buy: Seitz' "Macrolepidoptera of the World" Vols.1, 9, 13, English translation. George H. Berg, Room 319, Custom House, New Orleans 16, Louisiana.

Austrian hunter and collector (not dealer) in Amazon and Matto Grosso districts of Brazil takes orders for Lepidoptera and other insects, all with full locality and date. Also supplies amphibians, reptiles, and various terrarium animals. Write (in German if possible) to: Walter A. Riffler, Tecnico Zoológico, Caixa Postal 500, Belem, Pará, BRAZIL.

LIVING MATERIAL

The Editors will welcome especially notices for the exchange or sale of Lepidoptera eggs, larvae, and pupae, hoping to revive the old interest in rearing and to re-emphasize the importance of studying the immature stages. Contributors are urged to include accurate locality data with all material sent.

Interested in buying any living saturniid cocoons and about 100 chrysalids of any butterfly. Charles Walcott, Milton Academy, Milton 86, Mass.

Living cocoons and pupae of giant Indian moths for sale. Sent by airmail. U.S. Dept. of Agric. import permits must accompany orders from U.S.A. Remittance must accompany all orders. Probable garden food plants in parentheses: Actias selene (Walnut, Cherry, Hibiscus) - $0.20; Samia cynthia (Ailanthus) - 0.12; Antheraea edwardsi - 0.50; Loepa katinka (Ivy, Va. Creeper) - 0.20; Antheraea mylitta (oaks) - 0.40; Brahmea wallichi (Ash, Privet, Lilac) - 0.50. Prices in U.S. dollars). Himalayan Butterfly Co., Shillong, Khasi Hills, INDIA.

Wanted to buy: cocoons of U.S.A. Saturniidae, pupae of Sphingidae, Papilio chrysalids, Catocala eggs, Hemileuca maia egg rings. Will exchange best make rust-proof steel pins Nos.0-7, value $4.00 per thousand, for cocoons and Coleoptera. Eugene Dluhy, 3912 N. Hamilton, Chicago 18, Illinois.

QUESTIONS FOR PROFESSOR FORBES

Professor Wm.T.M. Forbes, of Cornell University, has agreed to present answers to questions submitted by members on any aspect of Lepidoptera study. Questions are to be sent to the editor of the Lep. News.

Q. "Are there venational characters by which the Lepidoptera can be distinguished from all other orders of insects, and especially from the Mecoptera?"

A. Considering possible discovery of fossils this question becomes somewhat arbitrary, since Lepidoptera, Trichoptera, and Mecoptera certainly arose from a common ancestor, which shared the more primitive characters of all three. The primary characters of the Lepidoptera are the fully scaled wings and the epiphysis, both unique in the Insects, though there are fully scaled FORE wings in a few Coleoptera (e.g., Cupes and Anthrenus) and Trichoptera (part of Leptocella). Neither of these features would normally be visible in fossils. Nygmata can normally be seen in fossils and are present in Trichoptera and in almost all Mecoptera, but absent in all Lepidoptera; - but I can't find any in Merope and a loss is never as good a character as a gain of a structure. This leaves the small cell near base of hind wing (cell 2nd A) which is trapezoidal and much larger in primitive Trichoptera, but minute or lanceolate in Lepidoptera when visible; in the Mecoptera which have a developed anal area the pattern is more complex. Secondly the Mecoptera have a considerable number of cross-veins, irregularly arranged, the Lepidoptera a single set, with only one to a cell, like the Trichoptera. And thirdly no Lepidoptera have preserved vein M_4, while it is present in the fore wing at least in all primitive Mecoptera and Trichoptera - another loss character, and therefore subject to suspicion.

W.T.M.F.

RESEARCH REQUESTS

I have begun a revisionary study of the butterflies of the thecline genus Mitoura and need series of specimens of all species as listed in the 1938 McDunnough check list from all parts of their ranges, also preserved early stages and distributional notes. I hope to obtain material by purchase or exchange or, if need be, on loan. All material loaned will be returned promptly on completion of the investigation, determined and undamaged, and due acknowledgment will be made on publication. Please write: Dr. J.B. Ziegler, 18 Baltusrol Place, Summit, N.J., U.S.A.

Micropterygidae and Eriocraniidae from any part of the world are needed for systematic investigations. Larvae and pupae are most urgently needed, but adults in alcohol (not dry) are also desired. Specimens will be purchased or satisfactory exchange can be arranged.

Contacts are also sought with collectors in all parts of the world who wish to exchange or sell preserved larvae and pupae of all groups. Please write: Dr. C.L. Remington, Osborn Zoological Lab., Yale University, New Haven 11, Conn., U.S.A.

NOMINATIONS FOR NEW OFFICERS FOR 1952

"All officers shall be elected by ballot at the annual meeting. The President and all Vice-Presidents shall be elected for the term of one year, and shall be eligible to succeed themselves once. The Secretary and Treasurer shall be elected for the term of two years, and shall be eligible to succeed themselves twice. The six other elective members of the Executive Committee shall be elected for the term of three years; two of them shall be replaced each year, except that at the first election two shall be elected for one year, two for two years, and two for three years; these members shall not be eligible to succeed themselves. Members not attending the annual meeting may vote and be represented by proxy, or may vote for the election of officers and other members of the Executive Committee by mail ballot." (Constitution, Art.V, Sec.1.)

"The President shall appoint a Nominating Committee who shall nominate one candidate for each elective office to be filled for the ensuing year, and a list thereof shall be published in The Lepidopterists' News or mailed to the members at least sixty days before the annual meeting. Additional candidates may be nominated by submission to the Secretary of written nominations signed by not less than ten members." (Constitution, Art.VI, Sec.2.)

The members of the 1951 Nominating Committee are as follows:

Harry K. Clench George W. Rawson

Eugene G. Munroe, Chairman

Dr. Munroe reports that the nominees for vacancies for 1951, unanimously agreed on by all members of the Committee, are the following:

OFFICERS

President (term - one year):
Dr. KARL JORDAN (Great Britain)

Senior Vice-President (one year):
Mr. L. PAUL GREY (U.S.A.)

Vice-President (one year):
Dr. A. DIAKONOFF (Netherlands)

Vice-President (one year):
Dr. R.F. D'ALMEIDA

EXECUTIVE COMMITTEE
(three-year term)

Prof. Dr. HARRY FEDERLEY (Finland)

Dr. ROGER VERITY (Italy)

Ballots containing the names of all nominees will be mailed to all members of the Society in November. IT IS IMPORTANT THAT ALL MEMBERS PARTICIPATE IN THE ELECTION, BY PROMPTLY RETURNING THEIR PROPERLY MARKED BALLOTS TO THE SECRETARY, even should there be only one nominee for each vacant office!

C.L. Remington

THE LEPIDOPTERISTS' SOCIETY

OFFICERS

President:	J. H. McDUNNOUGH (Halifax, Canada)
Senior Vice President:	AUSTIN H. CLARK (Washington, U.S.A.)
Vice President:	WALTER FORSTER (München, Germany)
Vice President:	KENNETH J. HAYWARD (Tucumán, Argentina)
Secretary:	FREDERICK H. RINDGE (New York, U.S.A.)
Treasurer:	J. B. ZIEGLER (Summit, N.J., U.S.A.)

EXECUTIVE COUNCIL

Ex-officio: the Six Officers and the Editor-in-Chief

Term expires Dec. 1951:	THOMAS N. FREEMAN (Ottawa, Canada) HENRI STEMPFFER (Paris, France)
Term expires Dec. 1952:	LLOYD M. MARTIN (Los Angeles, U.S.A.) N. D. RILEY (London, United Kingdom)
Term expires Dec. 1953:	J. G. FRANCLEMONT (Washington, U.S.A.) TAKASHI SHIRÔZU (Fukuoka, Japan)

The object of the Lepidopterists' Society, which was formed in May, 1947, and formally constituted in December, 1950, is "to promote the science of lepidopterology in all its branches, ... to issue a periodical and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to secure cooperation in all measures" directed toward these aims (Constitution, Art.II). A special goal is to secure free interchange among the lepidopterists of all countries.

Membership in the Society is open to all persons interested in any aspect of lepidopterology. Prospective members must be nominated by two members in good standing and then become members by paying the current annual dues. Memberships are for full calendar years only. All members in good standing receive The Lepidopterists' News. Institutions may subscribe to the publications but may not become members. Applications for membership should be sent to the Secretary, and all correspondence concerning membership and general Society business should be directed to him. Completed membership forms and remittances should be sent directly to the Treasurer. All remittances should be made payable to: The Lepidopterists' Society. There are three paying classes of membership:

Active Members - annual dues $2.00 (U.S.A.)
Sustaining Members - annual dues $5.00 (U.S.A.)
Life Members - single sum $50.00 (U.S.A.)

The minimum fee for Active Members is not sufficient to finance the News and other Society activities. Nevertheless, this fee is kept low so that cost of membership will not be burdensome to any member, regardless of monetary difficulties in his country or private economic reasons. Obviously, the Sustaining Members make up the difference. A large proportion of the Society members have always maintained themselves generously in the Sustaining category. Members not yet Sustaining are earnestly urged to consider elevating their class of membership.

Each year a list of all members of the Society is published, with addresses and special interests.

An Annual Meeting is held each year at which election of officers and presentation of papers and exhibits take place. All members of the Society are expected to vote for officers when mail ballots are distributed by the Secretary. Special Meetings may be called by the Secretary on receipt of a written request from the President or signed by ten members.

TABLE OF CONTENTS — SOMMAIRE — INHALT

VOLUME 5 1951 NUMBER 8

The LEPIDOPTERISTS' NEWS

Published by THE LEPIDOPTERISTS' SOCIETY
Publié par LA SOCIÉTÉ DES LÉPIDOPTÉRISTES
Herausgegeben von der GESELLSCHAFT DER LEPIDOPTEROLOGEN

IN THIS ISSUE

1952 ANNUAL MEETING TO INCLUDE FIELD TRIPS

Site: OTTAWA, ONTARIO, CANADA.

Date: 2 - 5 July 1952.

(see page 120)

(mailed 15 April 1952)

NOTICE TO CONTRIBUTORS TO THE NEWS

Contributions to The Lepidopterists' News may be on any aspect of the study and collection of Lepidoptera in any part of the world, except that papers describing new species, genera, etc., or proposing nomenclatural changes, should be published in more formal journals and will not be accepted for the News. Particularly solicited are: 1) review papers on subjects of general interest to lepidopterists (e.g., mimicry, wing venation); 2) field notes of more than a very local nature; 3) notes on well-tested techniques; and 4) news of lepidopterology (e.g., personalia, societies, new periodicals). Line drawings are easily handled in the News; authors should write the Editor for details concerning the correct size for original drawings. Photographs should be very sharp and have good contrast.

Manuscripts should be typed if possible, but clear hand-written manuscripts are acceptable. ALL MANUSCRIPTS SHOULD BE DOUBLE-SPACED (blank lines alternating with written lines), and wide right and left margins are needed.

Ordinarily, manuscripts should be in English. However, the editors will translate short notes which are received in French, German, Spanish, Portuguese, or Russian. Authors of longer manuscripts who do not find English easy should prepare an English manuscript and permit the editors to correct the writing. Brief summaries in non-English languages are always welcomed at the end of any paper.

Authors may request in advance about 75 gratis separates of any paper over one column in length. Additional separates are available IF ORDERED IN ADVANCE, at the rate of $3.00 per hundred for papers of any number of pages within a single issue. Ordinarily, the cost of photographs will be charged to authors, but the rate is low. There is no extra cost for line drawings.

The editors reserve the right to adjust style (citation of references, italicizing names, etc.)to fit News standards of uniformity.

Address editorial correspondence to: Dr. C.L. Remington, Osborn Zoological Laboratory, Yale University, New Haven 11, Connecticut, U.S.A.

Address Society correspondence to: Dr. F.H. Rindge, Department of Insects and Spiders, American Museum of Natural History, New York 24, N.Y., U.S.A.

Address remittances to: Dr. J.B. Ziegler, 18 Baltusrol Place, Summit, New Jersey, U.S.A.

The Lepidopterists' News

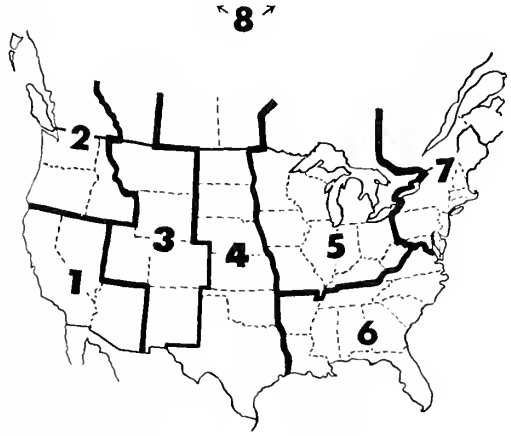
Volume V 1951 Number 8

THE FIELD SEASON SUMMARY OF NORTH AMERICAN LEPIDOPTERA FOR 1951

The season of 1951 appears to have been one of normal or above-normal abundance of Lepidoptera. The outstanding climatic events were severe summer droughts in the northwestern region, and to a lesser degree in the southwestern and south-central regions. In parts of the Northeast, prolonged wet and cool weather in the summer interfered with collecting, and perhaps with amount of flight, to some extent.

MIGRATIONS

In most regions migrations seem to have been inconspicuous, and there are only scattered reports of migrant activity. Danaus plexippus appears to have had a fairly strong migration in the East, but it did not penetrate far to the North. Nymphalis californica was seen migrating in Monterey Co., Calif., on June 9, and in the High Sierras in August. In Arizona and New Mexico Celerio lineata larvae were in plague abundance, but migrations of the moths were not noted; perhaps C. lineata will emigrate in 1952.



SEASON SUMMARY ZONES

UNUSUAL EVENTS

The great outbreak of Malacosoma disstria in the northeastern and north-central regions was much intensified in 1951; there were widespread areas of defoliation, and even outside of those areas the moths occurred in unbelievable numbers. A notable event in the West was the appearance of a second brood of Euphydryas in various localities. In the Lake States Nymphalis milberti was remarkably numerous. There are many new records for states, provinces, and even the Continent.

PROCEDURES IN SUMMARIZING

The usual practices have been followed, to ensure clarity and uniformity. Subspecific names are in general omitted except where they may be of distributional significance, or where several subspecies occur in a limited area. Authors' names are omitted after species names. The nomenclature in general follows Klots' A Field Guide to the Butterflies (1951) for the eastern butterflies, with names of western butterflies harmonised so far as reasonably possible. The nomenclature of the moths follows the arrangement of the Canadian National Collection, which is based on McDunnough's Check List of the Lepidoptera of Canada and the United States of America (1938-39), with revisions indicated by more recent work.

This year more comparative data are presented than have been available for any preceding Summary. Likewise, the participation has been greater than ever before, over 90 individual reports having been utilized! This was due largely to the record response in the rather densely populated Central and Northeast areas, with 25 participants each. The two proportionately weakest areas are California and the Southeast.

There is a suggestion that 1952 will be a year of increased migrations, and News readers are urged to keep careful notes in great detail of any observation of Vanessa cardui, Celerio lineata, and others.

Eugene G. Munroe

by Lloyd M. Martin
Los Angeles, California

CALIFORNIA

Collecting reports again show that lack of rain has kept the Lepidoptera at a low point through most of southern California. In the northern part of the state the rainfall was about normal and most species appeared as usual. The fall of 1950 in northern California was open and mild, the rainfall of the 1950-51 winter season was almost normal, lacking only a few hundredths of an inch. The early spring was rather mild and insects came out early or normally. Subsequent cold, windy weather and unseasonable storms caused a recession in emergence and most of the regular late spring insects seemed to be delayed. By late May and June, however, the warm weather and lack of rain had caused the season to catch up and during the rest of the year it was almost normal. It is the exceptional season that is very good for collectors, and this season was not more than usually good.

NORTHERN AREA. Among the highlights might be mentioned these: Precis coenia was more than usually common and its prickly black larvae were found on plantain and commonly on cultivated snapdragons, to the disgust of home owners. Vanessa carye was especially common in the late fall brood; larvae were taken by one of the San Jose State College classes in large numbers and many were reared; in fact, it was so common it was used as a laboratory insect to show complete metamorphosis. In general, it was not a good year for Hesperiidae, but Hesperia dodgei seemed to have a very good year.

At Alum Rock Park in Santa Clara County P. coenia, Philotes sonorensis, Anthocharis sara, Pieris rapae, Colias eurytheme, Glaucopsyche lygdamus and Euchloe ausonides were reported as early as Feb.16 and 24 by Mr. Samuel Smoker. By the end of February it turned cold with heavy rain and snow and several heavy frosts; by March 10 the days were warmer, and butterflies and moths were appearing again. On March 11 in the Silver Creek Hills area, E. ausonides, C. eurytheme, Euphydryas editha, P. coenia, Lycaenopsis pseudargiolus, Autographa californica, Melicleptria pulchripennis were taken. To the south in the San Luis Obispo County area on March 18 it was too cold and too early, but it was a much later season than in 1940; only very few of the early species were out. By April 15 the weather had warmed up and Mitoura siva mansfieldi, Melitaea leanira wrightii, M. palla, G. lygdamus, Plebeius acmon, Everes amyntula, Polites sabuleti, and Atalopedes campestris were out.

By May 30 Mocho Creek in Alameda County had warmed up enough to produce a few interesting things. Strymon auretorum and S. dryope were rare at Arroyo Bayo in Santa Clara County; Euphydryas chalcedona, E. editha, Nymphalis californica and antiopa, Papilio rutulus and eurymedon, Strymon saepium, Plebeius acmon, Ochlodes agricola, and Danaus plexippus were all quite scarce. A few larvae of D. plexippus were found feeding on Mexican milkweed. On June 17 on the north side of Mt. St. Helena (near the Napa - Lake County line) it was very hot and badly dried, very little being seen on the wing: only a few E. chalcedona, Limenitis lorquini, and Adelpha bredowii californica. On June 18 at Bear Creek, Mendocino National Forest, collecting was good: Papilio eurymedon and rutulus were common; P. zelicaon, P. philenor, and P. multicaudatus were quite scarce. Parnassius clodius was common; about forty were taken in two hours collecting, flying to flowers of Monardella and milkweed. Also taken were: Speyeria callippe and hydaspe, Vanessa virginiensis, carye and atalanta; D. plexippus, Cercyonis alope and sylvestris, Colias eurytheme, P. rapae, Coenonympha californica, Lycaena xanthoides and gorgon (the latter badly worn); Strymon sylvinus, S. californica, S. auretorum, Incisalia iroides, Plebeius acmon, Erynnis propertius and Pyrgus communis. Of the moths Pholus achemon, Sphinx perelegans, and Hemaris senta were all taken at milkweed flowers. The moon was nearly full and light did not attract much.

On the eastern side of the Sierra Nevada Mts., near Lone Pine in Inyo County, on Aug.14 Plebeius melissa was scarce but Pseudocopaeodes eunus was common; collecting as a whole was very poor. On Aug.15 at Tioga Pass collecting was fair: Speyeria mormonia was common, Colias behrii scarce, Plebeius shasta, P. aquilo, and P. saepiolus were fairly common, Lycaena editha, L. mariposa, L. nivalis, L. cupreus, and L. rubidus were present but not common; Oeneis chryxus and Euphydryas nubigena were present but very badly worn. Near Leevining in Mono County on Aug.16 Speyeria nokomis was present but not common; Everes amyntula was rare; Plebeius saepiolus was scarce, as was Limenitis weidemeyerii; Ochlodes sylvanoides was fairly common. Pieris occidentalis and P. beckerii were present. At Bridgeport, the same day, Ochlodes sylvanoides, Polites sonora, Coenonympha ampelos, Cercyonis oetus and C. silvestris and Polites sabuleti were taken but were quite scarce and well worn for the most part. Between Aug.31 and Sept.21 in the Alum Rock Park area in Santa Clara County, most of the common species had appeared, with Danaus plexippus apparently migrating toward the coast. At this time of the year the second broods of some species were on the wing, but were not as common as earlier in the season.

Thomas W. Davies reports from the Bay area: The collecting season did not have a very good start. The early morning fog that we have in summer began the end of March and continued to the end of September. A great many of the days were never free from heavy fog and consequently collecting in the immediate Bay area was very poor. Although the coast area was shrouded in fog the interior coastal valleys were warm and most of our collecting was spent in the foothills forty to fifty miles from the Bay region.

In the Mocho Canyon region, east of Livermore, the collecting was fairly good on April 1: fourteen males and eight females of Pieris sisymbrii were taken; Pholisora catullus was common, along with Anthocharis sara and Erynnis propertius. One specimen of Atlides halesus was taken. In this same canyon on April 19 the day started cool with a high fog which disappeared by noon. Euphydryas editha was quite common, having made a reappearance after an absence

FIELD SEASON SUMMARY 1. SOUTHWEST - cont.

of four years from its favorite hilltop. Only two specimens of E. chalcedona were taken, it being a little early for this common species. Specimens of Papilio zelicaon that looked and acted very much like Papilio bairdii brucei were taken in swift flight over the high hilltops, in company with E. editha. C. eurytheme, P. acmon, and C. californica were scarce and only a few fresh specimens were taken. Pholisora catullus had disappeared and was replaced by Hesperia columbia on the higher points of ground; seven males of the latter species were taken.

Mitchell Canyon, which lies in the shadow of Mt. Diablo, Contra Costa County, was the objective on May 19. A number of species were in full flight. Eighteen males of Papilio multicaudatus were taken, but no females were seen. Pieris rapae and P. napi were common; the latter was somewhat worn, and one specimen of the later brood, P. castoria, was taken. Coenonympha californica, L. lorquini, Adelpha californica, P. acmon, and M. palla were common. One specimen of Melitaea leanira was taken, showing that the season was just beginning for this little species.

A third trip to Mocho Canyon on May 30 found the canyon very dry. The only species collected in numbers was Speyeria callippe, mostly fresh males with very few females flying. M. palla was taken but in reduced numbers and some in damaged condition. Lycaena xanthoides was caught in fresh condition and one fresh male specimen of Strymon dryope was taken near water in the lower end of the canyon.

An excursion to Alpine, Lake, and Marin Counties on June 3 did not result in very good collecting. The weather was fair and most of the plant life was in bloom, but insects were poorly represented. The most common species was E. chalcedona; some of these were in worn condition. A quick trip to Point Reys, Marin County, was made in the same day; here collecting was much better. On the sand-dune-covered peninsula Plebeius pheres (?) was flying in company with Platyprepia virginalis in good numbers. A stiff wind was blowing with a slight overcast of fog. Callophrys dumetorum was found in the depressions between the sand dunes, keeping away from the winds.

On June 10, at Chews Ridge, Monterey County, Speyeria adiaste clemencei was found in fair numbers. Only one female was taken; the males in fresh condition showed the season was beginning for this subspecies. Melitaea gabbii and Strymon californica were common, with the latter species the more prevalent. Males and females of Speyeria coronis in poor condition were taken in company with S. clemencei. A migration of Nymphalis californica was noticed here. On June 9 the species was seen to be flying north-east with from two to three specimens passing a given point every 20 to 30 seconds. On June 10 the migration had stopped and only strays were flying, some of these flying back whence they came in a haphazard way.

Collecting in Mitchell Canyon on June 30 yielded a number of Lycaenidae. The most common species were Habrodais grunus and Strymon saepium. Strymon adenostomatis and Tharsalea arota were taken in fair numbers. The early spring butterflies had disappeared; Papilio multicaudatus was lacking, the fall brood not having appeared.

In the higher Sierra Nevada Mts. on Aug. 4 and 5 most of the early species were gone. Speyeria mormonia was common in the meadows of Sonora Pass. A few specimens of S. montivaga were taken in the same meadows, along with Lycaena rubidus, editha, and Pieris occidentalis. A few ragged specimens of Oeneis stanislaus were taken at this lower elevation. At the summit of Sonora Pass, Oeneis stanislaus was at the end of its season with very few perfect specimens being taken. Eumenis ridingsii was sought but not found. On Aug. 4 of the previous year, fourteen specimens of this species were taken, while at the same time O. stanislaus had disappeared. This shows that Eumenis ridingsii is a much later insect than O. stanislaus, and also indicates the discrepancy between dates of appearance in the two years. Other species taken this year at Sonora Pass were Plebeius melissa, aquilo, and P. shasta, all of which were quite common.

Another migration of Nymphalis californica was noted at Sonora Pass. The specimens here were flying southwest at about one to two every 30 to 60 seconds. These were all fresh, perfect specimens and of a much darker underside color than the Monterey swarm.

A trip made to Santa Cruz County in the first part of June for Speyeria adiaste and S. coronis was very unproductive, only two or three coronis being taken. It has been noticed in past years the large red Harvester Ants have been increasing in such large numbers that they overrun the woods. From one ant-hill two feet high and five feet wide an army of ants from 12 to 18 inches was moving in a solid front through the woods. Whether these ants attack the larvae and eggs of Lepidoptera, I do not know, but it does seem odd that the ants increase while the Lepidoptera population decreases. In passing I may say that the "Monarch", Danaus plexippus, returned to Pacific Grove in Monterey County at the butterfly trees in great numbers, after making a poor showing last year.

SOUTH-CENTRAL AREA. Collected in the San Gabriel area on Feb. 17 were 22 Philotes sonorensis, which closely corresponds numerically to the collection made the same date last year. The typical annual and perennial plants here were noted to be several weeks later than last year. Big Dalton Canyon was searched the same day for this species and none was found, although several stations were visited.

Returning to these localities Mar.14, we took 50 males and 13 females of P. sonorensis near the pump station in San Gabriel Canyon; Glaucopsyche behrii and Plebeius monticola sparse and fresh. In Big Dalton Canyon 2 males and 1 female P. sonorensis were taken. At this locality the plant association with which it was found is quite different, being the stream bottom and sides in a steep canyon, rather than on the flat wash. The foodplant, Dudleya lanceolata, was abundant, however, in spite of different dominant vegetation and exposure. It was subsequently noted that a considerable difference in wing-pattern is found between individuals from these different habitats. Subsequent investigation has shown a similarity in morphology correlated with

ecology over the whole range of this species (San Francisco Bay to Lower California). Zerene eurydice, Anthocharis reakirtii, and Vanessa atalanta were taken. Next we collected in San Gabriel Canyon again, but at a place about two miles above the pump station on the steep canyon wall. Here 1 male P. sonorensis was found (like the Big Dalton Canyon form), in addition to males of Anthocharis reakirtii and Papilio eurymedon.

On April 8 we collected at Toyon Cove, Santa Catalina Island. Anthocharis sara gunderi, Everes amyntula, Glaucopsyche behrii, Strymon avalona, and S. adenostomatis were seen, and all but Strymon avalona were quite abundant, particularly around a flowering mint.

Several collections were made in the Santa Monica Mountains from March through May. The usual species, viz.: Anthocharis reakirtii, A. sara, Coenonympha californica, Glaucopsyche behrii, Papilio rutulus, P. eurymedon, were all abundant, in quantities not unlike those of previous years. Melitaea gabbii was far more common than usual; it was possible to collect hundreds in one day at several different localities over the period of flight from late March to mid May.

In the San Jacinto mountain area on April 14 Pieris sisymbrii was occasional (a dozen seen and four taken) at Pinyon Flat. Ocotillo and Palo Verde were in full bloom here, indicating a somewhat wet season for this area as compared to the dry spell of the last four years. In Tahquitz Canyon several Melitaea chara were taken, although these were by no means as abundant as in 1944, when they were seen by the thousands in the same place. In 1945 and 1950 they were totally absent at the same approximate date. Philotes battoides was taken in small numbers.

In the area around Schroebers Camp, Bishop Creek, Inyo County, on July 6 vegetation was very dry; the characteristic iris of the meadows were well past flower, indicating an early season as compared to that of 1945. The butterfly fauna further supported this conclusion. Weather conditions on the east side of the Sierras seemed rather variable locally; the indications were that the season was brief and early. Plebeius icarioides was the commonest butterfly, with a few other Lycaenids and Nymphalids about but not common. July 7, at Onion Valley, upper Independence Creek, a beautiful subalpine meadow at nearly 9,000 ft. was found. The meadow itself was quite moist and is surrounded by slopes on which Eriogonum umbellatum (sulphur flower) was predominant. Up the slope, Philotes enoptes were taken at 9,400 ft.; at 10,000 ft. Plebeius lupini and P. enoptes were fairly common, as was Euphydryas nubigena; at Heart Lake, 11,000 ft., Philotes battoides was just coming out, quite early for this insect at this elevation. There were only occasional snow patches. On July 8, down Independence Canyon from 8,000 to 6,000 ft. Pieris occidentalis, Cercyonis paulus, Euphydryas olancha, Plebeius lupini, and Melitaea palla were present but scarce. Strymon saepium, Lycaena heteronea, and Plebeius icarioides were all very common, and a number of each were taken, mostly on Eriogonum umbellatum. Where the road crossed the stream Papilio eurymedon, Limenitis lorquini, Papilio rutulus, and Lycaenopsis argiolus were common and easily netted.

On July 17 in the open meadows about Mather, on the west side of the Sierras, north of Yosemite at 5,800 ft., the meadows were drying rapidly. Monardella was common and very attractive to Speyeria leto and Plebeius monticola, which were abundant; only male leto were seen. One male Tharsalea arota was seen. In the Humphrey's Basin area on July 18-19 little collecting was done due to the persistent rain. The amount of snow in the basin was about equal to that present at the same time in 1945. The butterfly fauna was similar except that Parnassius behrii and Oeneis ivallda were not seen, whereas they were abundant in August of 1945. Colias behrii, Philotes battoides, Euphydryas nubigena, Plebeius saepiolus, podarce, P. lupini and P. shasta were all out in good numbers.

On August 18-19 along the San Simeon Highway, on the coastal cliffs of the Santa Lucia mountains near Big Sur, it was hoped a long series of the new Philotes enoptes subspecies could be taken, but only three were found. The heavy fog probably accounted for this, as on the same date in 1948 Claude Smith and Rudy Mattoni took 30 in an hour. Everes amyntula were common when the sun was out. The season was presumably later because of the persistence of the summer fogs, which usually disperse earlier than this date.

On June 7 in the Bouquet Canyon area the vegetation was very dry, very little rain having fallen since the last of February. However, a quantity of Hesperia lindseyi were taken, mostly on the flowers of Yerba Santa and thistle. The females and some of the males were in poor condition, which showed the season was far advanced; normally the species should be just appearing at this date. Ochlodes agricola, Heliopetes ericetorum, Strymon saepium, Plebeius monticola, and Strymon californica were taken, but in small numbers. Speyeria macaria and S. callippe comstocki were very common on the flowers of Yerba Santa. At this locality it is hard to differentiate between these two species (?); they seem to interbreed to such a great extent. Some specimens are typical S. macaria and others typical S. callippe comstocki, with all the intergradations in between. One very old female specimen of Papilio indra pergamus was netted but released as soon as a correct determination was made; it is not normally found at this low elevation and locality.

SAN DIEGO COUNTY AREA. We were fortunate in having seven collectors in this area during the year, and this summary is a compilation of their efforts.

During the winter, spring, and summer the prolonged drought continued to have an adverse effect on Lepidoptera. Temperatures were somewhat above normal except in the mountain areas where the season was late and cool with snow as late as April. Winter and spring were marked by bright clear spells, and summer temperatures were not extreme. Fall rains were above normal, exceptionally so in desert areas. Up to November 27, Needles had 4.60 inches, Blythe 4.75 inches, El Centro 2.57 inches, and rainfall has been well above normal in San Diego County for the fall and winter season.

Early season emergence was about normal with Glaucopsyche lygdamus, Everes amyntula, Philotes sonorensis, Coenonympha californica, and Copaeodes wrightii appearing by mid-February. Spring flights

FIELD SEASON SUMMARY 1. SOUTHWEST - cont.

were mostly poor, in the desert areas especially poor until late summer.

Summer emergence was normal except at higher elevations where the season was delayed three weeks, reaching a peak about July 15 compared to a normal date of around June 25. May collecting in the mountains was especially poor. Flights of most species were below normal during summer.

Fall collecting in coastal mountain areas was not good, but it seldom is. On the desert, following heavy rains in August, enormous flights of Melitaea chara, Papilio rudkini, Apodemia mormo deserti, and other species occurred. The desert dried up by November 1, and collecting was nearly over.

Late fall flights of common species were average in quantity and dates in urban areas. There was no marked migratory movement, although Danaus plexippus was more abundant than a year ago at the end of the season.

Hesperioidea probably suffered the greatest reduction in numbers, followed by Nymphalididae, Papilionidae, Lycaenidae, and Satyridae, while Riodinidae and Danaidae were almost normal.

Some general information on species follows: Anthocharis cethura was again found at Otay in the immediate coastal areas in March. What we have been calling Euchloe creusa lotta is probably E. ausonides andrewsi, considerably extending the range of this race (Laguna Mts. April 22, Warner Hot Springs April 14).

A fresh female Euphydryas chalcedona was taken July 21, substantiating the existence of a partial second brood here. Colias harfordii was taken in numbers near Alpine in June and July, in foothill areas rather than the customary mountain areas. Strymon adenostomatis was very abundant in the mountains July 15, but most other Theclinae were scarce. A few specimens of Strymon leda ines were taken Oct. 28; it begins to look like this may be nothing more than a late-season form of S. leda (Klots mentions such a form of Strymon clytie).

A single fresh male Papilio philenor was taken in the desert Sept.16, miles from any possible foodplant. This species is rare here, and the wild foodplant is undiscovered, no native Aristolochia being known. Strymon columella was scarce but was found where the recorded food plant, Sida hederacea, could not be found, indicating that it probably will eat other malvaceous plants.

Larvae of Papilio rudkini were abundant on Thamnosoma montana during September and October in the desert. Melitaea chara was the first species to respond to desert rains, appearing in heavy flight on Sept. 3, followed by a second brood three weeks later. The foothill colony of this species at Lakeside did not appear in flight until mid-September but then flew in good numbers.

Calephelis wrightii was found near Lakeside again, showing that it is established within twenty miles of the ocean. Nathalis iole, usually scarce, was common in October in desert canyons. Eurema nicippe, after several years below normal, made a comeback in November. Phoebis sennae, however, has remained at abnormally low levels for several years now.

VARIOUS CALIFORNIA LOCALITIES. On June 11 at Lake Hughes, Los Angeles County, E. chalcedona and Cercyonis sylvestris were common, Speyeria macaria scarce, and at Sandbergs S. atossa was not found. In Bouquet Canyon June 11 and 12 Speyeria macaria was abundant, other butterflies scarce. (Thorne)

In the Tehachapi Mts. on June 13 Strymon saepium and S. californica were very abundant, E. chalcedona abundant but worn, other species probably average. In the coastal ranges west of Bakersfield butterflies were scarce; only a few Speyeria callippe were taken. At Atascadero diligent collecting resulted in only one male Speyeria adiaste clemencei on June 15. Collecting was poor in this area.(Thorne)

At Blythe on June 25 Strymon columella was scarce, Pyrgus scriptura fairly common, Chlosyne lacinia and Limenitis archippus obsoleta could not be found. At Blythe on Aug.26 Chlosyne lacinia larvae were exceedingly numerous, Danaus gilippus larvae abundant, but imagines of all butterflies were scarce. (Thorne)

In the Providence Mountain - Essex area on Aug. 25 the country was turning green but it was too early for collecting. A single gravid female Papilio rudkini produced 32 progeny, 10 dark males, 10 dark females, 6 yellow males, 6 yellow females, indicating heterozygous parentage on both sides with black dominant. I was unable to mate the F_1 generation in captivity. (Thorne)

In the Sierra Madre mountains of the Santa Barbara area from June 20-24, the following were abundant and fresh: Brephidium exilis, E. chalcedona (some worn), Ochlodes nemorum. Less common, but fresh, were: Coenonympha california, Strymon (adenostomatis?), Heliopetes ericetorum, Erynnis tristis. Plebeius acmon was abundant and partly worn. Of Melitaea sp. only an old ♀ was found, although numerous larvae (of this?) were found in nests of Mimulus. One Danaus plexippus was seen closely. (Remington)

NEVADA

On June 18 C.L. Remington found Rhopalocera at various altitudes near Angel Lake in the Ruby Mts. Abundant species were Papilio eurymedon (♂♂ fresh and poor, 1 ♀ fresh), P. rutulus (fresh), Anthocharis sara (♂♂ fresh), Euchloe ausonides (♂♂ fresh), Nymphalis antiopa (worn), N. milberti (worn), Speyeria nevadensis (♂♂ very fresh, ♀♀ just emerging), Phaedrotes piasus (fresh ♂♂ in myriads on moist spots), Lycaenopsis pseudargiolus (fresh ♂♂), Plebeius icarioides (fresh ♂♂ and ♀♀). Scarcer species were: Pieris napi (fresh ♂♂), Nymphalis californica (worn), Incisalia sp. (worn and fresh ♂♂), Glaucopsyche lygdamus (fresh ♂). The same day at Wells, fresh Pieris beckeri were numerous. On June 28, at Deeth, also in Elko County, P. protodice was abundant and worn; Coenonympha tullia, Lycaena helloides, and Minois sp. were scarce and fresh.

ARIZONA

HUALAPAI MOUNTAINS. June 22 and 23: Strymon autolycus ilavia, Atlides halesus, Epargyreus clarus were abundant, other species probably below normal. August 24: mountains were green and excellent for butterflies but too early. All species were scarce. (Thorne)

YARNELL AND PRESCOTT. On June 21 Eurema mexicana,

Papilio bairdi, P. philenor, Nathalis iole, Hesperia ericetorum, Melitaea perse were common; Chlosyne californica, Asterocampa leilia, Melitaea thekla, Antigonus pulveruleuta, Strymon alcestis were all rare. (Thorne)

YUMA. In the Gila Mountains on Oct.27, Pyrgus scriptura, Strymon columella, and a few lycaenids were found, thirty days late for this section. (Thorne)

VERDE VALLEY AREA (D.L. Bauer). Last year's season summary left off with the very cold wave that hit most of the state on Nov.9. It was the only really cold spell that we had all winter. The weather proceeded to warm up soon afterward and by the last week in November Eurema nicippe and Pieris protodice were out in some numbers. They continued on the wing in the Verde Valley until the 27th of January when they were last observed. The last of January a storm hit the state that brought rain and snow and was the first good rain of the winter. After this storm it stayed cold and no butterflies were observed until the middle of March. This period from the last of January to mid March was also dry as well as cold. From the last of March through May, which is usually the time for the winter rains to taper off, we had good rains and at times rather heavy snow in the mountains. This precipitation was brought by a series of storms at about ten-day to two-week intervals. The last one came in mid May and brought considerable snow to the mountains. There were a few showers after this date but nothing heavy.

The usual dry spell came by June, just about a month late, and ran into the first half of July, with the summer rains a few weeks late. Once the summer rains got started they continued through the last week of July and August. The last few days of August brought a three-day storm that brought heavy rains to most of the state. Nearly four inches fell in the Verde Valley and up to six and seven inches in the mountains. After this heavy summer storm the rains continued at intervals throughout the rest of the year. September precipitation ran over an inch in the Verde Valley, as it did also in October; November rainfall dropped to .57 inches and in December is off to a good start.

The weather for the period can be summed up as follows: the winter was very dry and warm; early spring was dry and cool; late spring wet and cool; summer wet and warmer than the previous two years; fall wet and about average in temperature; early winter wet and a little on the cool side: no hard hitting cold waves but a gradual dropping of temperature.

Here were the effects of this weather pattern on the Lepidoptera. As was noted above, E. nicippe and P. protodice flew through December and January. During February and the first half of March no butterflies were seen and only very few moths. Early spring species were late and many of them well below last year's numbers. Lycaenopsis argiolus made a very poor showing, only a few specimens being taken, in marked contrast to 1950 abundance. Incisalia iroides dropped from being the most abundant spring species to very rare this year. Anthocharis sara also dropped in numbers as did Euchloe creusa and nearly all spring species except Melitaea gabbii sabino, which, if anything, showed a slight increase. Almost all skippers showed a decrease in numbers, several being absent. Among those taken a year ago but not this year were Pyrgus scriptura and P. philetas, Celotes nessus, Erynnis horatius, Caicella caicus, and Papilio polyxenes. Moths did not make too good a showing either; however Litocala sexsignata, which was very abundant last year, was also abundant this spring. There may have been a slight drop in numbers, but there were still thousands of them.

The rains that came in April and May brought out the late spring and early summer butterflies in unusual numbers, with a number of new records for the Verde Valley area. By mid April collecting was good and continued good through July. Melitaea and Euphydryas were out in good numbers. Anthocharis sara increased in numbers through April, as did L. argiolus. Incisalia iroides remained rare. New records for the Cottonwood area during late spring were: Strymon alcestis, Mitoura spinetorum, Erora quaderna, Strymon autolycus ilavia, Euptychia rubricata, Agraulis vanillae.

Collecting continued to improve through May and June, resulting in record numbers of species and record abundance for many species. On June 28-29 I kept a record of the species that visited a short series of springs in the canyon just above Jerome on Mingus Mt., and in the three or four hours total observation on the two successive afternoons a total of 40 distinct species of butterflies visited the damp ground for drinks; the surface of the water was covered with moths that had become bogged down. While I watched I saw many butterflies alight on this covering of moths that floated on the water. Some took off as the moths gave way under them, but not a few were bogged down as the covering gave way under them. I was too busy collecting and observing the butterflies to determine the various species of moths, but did observe that most of them were Geometroidea of many species. (Detailed notes are appearing elsewhere in the News).

During April to July nearly all species showed great increases in numbers, and, as stated above, many new records were obtained in the Cottonwood-Mingus Mt. area. The most outstanding increase in numbers was that of Limenitis weidemeyerii. Last year only three specimens were seen after much searching in remote canyons above 7,000 ft. on Mingus Mt. This year they were the most abundant butterfly at the springs and water holes down to 5,000 ft. all during June and into July. It seems almost impossible such an increase could occur in just one season. Another hard-to-understand occurrence was the sudden appearance of Strymon autolycus ilavia in considerable numbers, in fact it was the most common Hairstreak of the May-June season. Last year I searched diligently in the same area and in the identical locations and did not even see one. There were some species, that usually fly only after the summer rainy season, that came out in late June. For example Philotes enoptes dammersi, normal flight period September, was seen in June. The following species showed considerable increases over last year's flight: Euptychia dorothea; E. rubricata; Melitaea pola; Euphydryas klotsi; L. weidemeyerii; Asterocampa celtis; Apodemia nais (new record); Atlides halesus; Strymon autolycus; S. alcestis; Atrytonopsis deva; A. vier-

FIELD SEASON SUMMARY 1. SOUTHWEST - cont.

ecki, and A. pittacus. Most other species showed some increase, but a few were strikingly absent, namely: Papilio polyxenes; Euptoieta claudia - rare during spring and summer; Melitaea fulvia - one specimen only; Chlosyne lacinia and C. californica -very few; Polygonia satyrus -numbers reduced considerably; also Anaea andria, Plebeius melissa, Zestusa dorus, Yvretta carus did not appear all season; neither did Atrytonopsis python, while Megathymus yuccae remained almost the same as last year in numbers.

The usual low came the last of July and August. However, several species continued to increase: Papilio philenor, Colias eurytheme, Danaus plexippus, D. gilippus, Limenitis astyanax, Asterocampa celtis, and a few other of the commoner species.

The heavy rains the last few days of August had a spectacular effect of many of the species of butterflies. Many species immediately emerged and began to increase so that by the middle of September many species were out in great abundance. The increase in numbers continued through October in many species and in a few continued into November. Some that were not taken in the spring and summer or were very scarce are as follows: Euptoieta claudia made a tremendous gain in numbers in some sections after being almost entirely absent during the previous months; Eurema mexicana made a good gain after being scarce the first part of the season; both Danaus plexippus and D. gilippus made large gains in numbers, especially the former, which had been rare during the last year or so. Asterocampa celtis, Limenitis astyanax, L. archippus obsoleta, Anaea andria, Libytheana bachmanii, Hypaurotis chrysalus, Atlides halesus, Brephidium exilis, Hemiargus isolus, Philotes enoptes, Lycaenopsis argiolus, Cogia hippalus, Heliopetes ericetorum, Celotes nessus, Hylephila phyleus, and Lerodea eufala, all showed substantial increases over last year and over the spring and summer of this year.

A number of new records for the Verde Valley were obtained. September and October collecting turned up the following: Papilio bairdii rudkini, Melitaea dymas, M. perse, Nymphalis californica, Asterocampa leilia, (previous "A. leilia" records were A. celtis antonia).

But the most spectacular increase was that of Chlosyne californica. In all my previous collecting it has been a rarity, to be searched for in a few canyons at about the 4,000 ft. level; but during September and October they became, along with Euptoieta claudia the most widespread and abundant butterfly in the Verde Valley. The increase was not limited to the Verde Valley, for a trip to Yuma County the first of October showed them more abundant there than at any time during the four years from '46 to '50.

The most outstanding result of the late August rains was the appearance of an abundant second brood of Euphydryas klotsi! The Euphydryas are generally considered single brooded and the usual spring brood appeared the last of March, but the unusual fall brood was much more abundant than the spring one. This second one was not a freak local occurrence, for in five localities spread over a distance well over a hundred miles east and west they were out in mass numbers greater than in the spring flight. Since this genus is given to much geographic variation I checked thoroughly to see if the fall brood differed in any way from the spring as to color and markings and found no differences. Of course there is considerable variation in the spring brood but the variation of the fall brood was within the same limits. There was no decided tendency toward lightness or darkness, although there were many very light and very dark specimens taken. A total of about 200 specimens of the fall brood were taken so that any such tendencies could be observed.

Species that maintained about the same numbers this fall were as follows: Euptychia dorothea, Cercyonis meadii, Gyrocheilus patrobas tritonia, Phyciodes mylitta, Leptotes marina, Hemiargus gyas, Plebeius acmon, Pyrgus communis, Hesperia woodgatei, Hylephila phyleus, Atalopedes campestris, Megathymus polingi. The following were taken for the first time in the fall: Nathalis iole, Phoebis sennae, Nymphalis californica, Pyrgus philetas. Nymphalis californica was unusual in its fall occurrence in that instead of remaining at its usual range in elevation it was flying about the mesquite trees in the Verde Valley at about 3,500 ft. elevation. No migrating trend was observed.

The gradual cooling of temperatures with no sudden severe cold snaps prolonged the breeding of a number of species. A good example is Euptoieta claudia, which bred until late November;a few larvae taken into the house emerged in December. Also Limenitis astyanax was observed ovipositing in mid-November, well after the willow leaves had begun to fall. All butterfly collecting came to an end by the end of November in the Verde Valley.

OAK CREEK CANYON AREA. Collecting in the Oak Creek Canyon Area followed much the same pattern as that in the Verde Valley. Early spring collecting was much below last year's, but June and July were much above last year's collecting for the same months. May also was better than in 1950. The variation in numbers was about the same as mentioned above. Incisalia iroides after being out by the thousands last spring was down to just a few casuals this year; Anthocharis sara also dropped considerably in numbers; Lycaenopsis argiolus was on the "less common" list too. Late spring species showed increases: Euphydryas hermosa, Speyeria atlantis, and a number of skippers. In late June Thorne found Speyeria sp., Limenitis weidemeyerii, Euptychia rubricata, Epargyreus clarus, Emesis clio were abundant. Polygonia satyrus, Limenitis astyanax, Adelpha bredowi, Papilio multicaudatus, Thorybes mexicana, Poanes taxiles, Eurema nicippe, Lycaenopsis argiolus, Dalla pirus were common; Atrytone ruricola and Incisalia eryphon were scarce.

SOUTHERN ARIZONA (Ford and Martin). Between March 12 and 18, various spots in southeastern Arizona were visited. Very few insects were found due to a late spring and to lack of rain in January and February. Anthocharis pima was just beginning to appear on the very top of "A" mountain to the west of Tucson, as well as on the rim of Bear Canyon in the Santa Catalinas. Normally this species should be in full flight on this date. The weather had be-

come warm during the day but the nights were cold, which was not good for moth collecting. Madera Canyon in the Santa Ritas was dry and cool at 5,000 ft. Three specimens of Erynnis burgessi were taken in fresh condition, whereas the Nymphalis antiopa were old and worn. The vegetation was very dry with no leaves; the willows were just beginning to show some signs of life. Pieris sisymbrii, Asterocampa leilia and Incisalia iroides were taken in very small numbers. Just to the south of Mountain View in Pima County, on the Tucson-Benson road, a colony of Megathymus yuccae was located on Yucca baccata; eight pupae were taken in three hours' work. The pupae were brought back to Los Angeles, where two ♂♂ and three ♀♀ emerged within a few days.

Between July 28 and Aug.12 a second trip was made to Madera Canyon in the Santa Ritas to photograph insects in their natural environment. Collecting was just fair; normally at this time of year many species of moths should have been out as well as butterflies. However, it had been raining all over southeastern Arizona for over two weeks prior to our arrival, which caused a delay in the emergence of most species. Narthecophora pulverea was found quite commonly; in years past this species had been scarce. A large freshly emerged female Anisota oslari was taken. One male Citheronia splendens was was found in a gas station in Nogales, while collecting Chalcopasta acema, which was a rare find. Phyciodes picta was found in a worn condition near the Baboquivari Mts., whereas Apodemia palmeri were were just beginning to make their appearance; normally these two species are out at the same time. Sphinx australis, which is normally found at this time of year was scarce; in previous years this was the time when they are out in numbers. Celerio lineata larvae were out in vast numbers, crossing the roads in all directions and feeding on almost any plant they could get to. In September the moths were a pest at the moth lights at night.

Between Aug. 19 and 26 a third trip was made to the different mountain ranges of southeastern Arizona. It was surprising to find the vegetation so green; all the way from the Chiricahuas in the east to the Baboquivaris in the west the wild flowers were in bloom, the grass tall and green, and the insect life spread all over the desert. Normally the summer rainfall in the desert areas is not as heavy as it was this year. This caused the populations of insects to spread out and the collecting was not as easy as in the past years when the populations were confined to canyons where it was moist and cool. In the Chiricahuas it was of interest to find very little rain had fallen on the east side of the mountains whereas on the west side the rainfall was above normal, and the insect population was accordingly so.

On the last collecting trip of the season, between Sept. 2 and 17, the Santa Ritas, the Patagonias, and the Baboquivaris were visited. Collecting was good, in most cases above normal. By this time the summer rains had tapered off and the fall insects were out in numbers. Apodemia palmerii was very common, more so than in years past, whereas Strymon leda was notably absent. Atlides halesus, Polygonus amyntas arizonensis, Danaus gilippus, and Eurema nicippe were some of the species taken commonly there. T. W. Davies was fortunate enough to get a freshly emerged Papilio ornythion in the lower part of Madera Canyon. Papilio cresphontes was not seen. A fresh male Eurema dina was taken, also in the lower part of Madera Canyon, by Martin. One male of Asterocampa subpallida, which is supposed to be endemic to the Baboquivaris, was taken by Ford, also in lower Madera Canyon. Davies and Hammer took 58 species of butterflies in two weeks at Madera Canyon, which shows the butterflies were out in large numbers. Eurema proterpia and gundlachia were scarce; normally they should have been out in numbers at this time of the year. Gyrocheilus tritonia were out in their usual large numbers above 6,000 ft. for about ten days, beginning on Sept. 8. In the moths, Antaplaga hachita and sexseriata were taken as was Hemioslaria pima, all very rare. Grotella binda, G. sorar, and Lythrodes radiatus were out for only a very short period. Cargida pyrrha was conspicuous by its absence; in years past it has been common, as has been Neumoegenia poetica.

In conclusion, the southern Arizona season was late in getting started, with more rain than usual in the lower flat lands during the summer. Due to the heavy rains the butterflies and moths were not confined to canyons as they have been in the past, and collecting was more difficult. It might be stated that this was one of the best seasons seen in the past 20 years of collecting in southern Arizona.

- -

Contributors: D.L.Bauer; R.J.Ford; T.W.Davies; R.H.T. Mattoni; S.S.Nicolay; C.L.Remington; F.T.Thorne; J.W.Tilden; W.A. Hammer.

2. NORTHWEST - OREGON, WASHINGTON, IDAHO, BRITISH COLUMBIA

by John C. Hopfinger
Brewster, Washington

[The scattered reports are not sufficient to indicate general trends; the severe summer drought affected most areas, but particularly Vancouver Island, where the dryness was unprecedented, and led to widespread forest fires and the closing of the forests to travel. The effect on the fauna appears to have been mixed, some species being depressed, but many scarce species being taken in unusual abundance. E.G.M.]

OREGON (Macy)

In western Oregon and Washington the winter had somewhat colder than average weather, but the summer was unusually warm and dry with cloudless skies until late September.

Both Papilio rutulus and P. eurymedon were

FIELD SEASON SUMMARY

scarce in western Oregon but a good many were seen on the islands of Puget Sound. Parnassius clodius also appeared to be less abundant than usual and there were fewer Anthocharis sara. Coenonympha tullia ampelos and Phyciodes mylitta were much less abundant in the Willamette Valley than usual. A rather fresh specimen of Adelpha bredowii was seen near McMinnville, Oregon, in October.

On the east side of the Cascade Mts., in central Oregon, there were considerable numbers of Lycaeides argyrognomon ricei in appropriate places and a few specimens of Plebeius shasta were captured. A number of Polygonia zephyrus were flying but very few Nymphalis californica were seen in the mountains and none elsewhere. Observations were more limited than in most other years.

WASHINGTON

EASTERN AREA (Frechin). An unusually warm and dry spring apparently contributed in part to some unusual population fluctuations in the diurnals. Species that overwinter in the pupal state appeared to show a decline in adults. Species apparently affected most were the spring emergers. Far below normal were Incisalia polios, I. eryphon, Callophrys dumetorum, Lycaenopsis argiolus, Glaucopsyche lygdamus columbia, Plebeius icarioides blackmorei. Species that appeared to benefit by the dry spring all pass the winter in the larval stage. A tremendous increase was observed for Parnassius clodius. Speyeria cybele pugetensis and Boloria epithore were more abundant than usual. The Hesperiidae appeared unaffected by climatic influences, with only Polites sonora showing a population decrease; only Epargyreus clarus was seemingly out in more than normal numbers. All Papilio continued to be scarce. The other diurnals had a normal season. Nymphalis californica and N. milberti were very rare. The above applies to spring collecting only. No collecting was done in the higher altitudes.

In the Tenino Prairie Euphydryas editha again appeared in tremendous numbers. A long series of Polites mardon was taken, but the males were badly worn. Four Hesperia juba were taken at the time, May 30. In June and July, Speyeria cybele pugetensis, S. zerene, and a fine lowland Hesperia, near hulbirti, was taken in good quantity. All other diurnals appeared to be in normal numbers.

In the Olympic Mountains collecting was confined to the lower levels near Lake Cushman. A long series of Mitoura nelsoni was taken where only a few examples were seen the previous year. M. johnsoni was a bit more in evidence, but still scarce. It is interesting to note that Incisalia eryphon and I. polios were quite common here, although scarce in the Basin. The precipitation is of course much heavier in the rain forests. All other diurnals were scarce as usual. Only the Mitoura and the Incisalia are actually residents of the dense rain forests, although species preferring untimbered or partially timbered areas, are established on the fringes of the forest.

2. NORTHWEST - cont.

PHALAENID COLLECTING AROUND WALLA WALLA (Cook). After early fall frosts, November was above normal in temperature. The winter and spring were about normal, but the summer was very dry. Moth collecting was about as poor as in 1950, and the average of 31.6 moths per night was next lowest in 7 years of operation.

Of 47 common species, 13 were higher than in 1950 and 17 lower. The rest showed no appreciable change. Of the very common forms, Euxoa messoria, E. septentrionalis, E. atomaris, Xylomiges rubrica and Autographa californica were much above normal, while Feltia ducens, venerabilis, Graphiphora c-nigrum, Scotogramma trifolii, Mamestra configurata, Lacinipolia stricta, Leucania farcta, Crymodes devastator, Platyperigea extima and Caenurgina erechtea were below normal in numbers.

Unusual captures included 4 specimens of Euxoa infracta and 1 of Prodenia praefica, the last of which has not been captured for several years.

The cold winters of 1948-49 and 1949-50 held down Heliothis obsoleta for two years, but the larvae were very abundant in late corn this fall. Schinia sexplagiata, of which as many as 1800 have been taken in some seasons, was absent entirely this year.

Cutworms reared from several locations in central Oregon turned out to be chiefly Euxoa septentrionalis, which is rarely, if ever, recorded as economic. The larvae were feeding on alfalfa in all cases.

NORTH-CENTRAL AREA (Hopfinger). The winter of 1950-51 was fairly mild, with a week's zero weather about the end of January. About the middle of March the hillsides along the river valleys were bare of snow. By the first week of April, such early species as Pieris sisymbrii, P. beckeri, and P. occidentalis were well out, reaching their peak about the middle of May. Euchloe creusa, E. ausonides, and Anthocharis sara also showed up in the normal (rather small) numbers. A cold spell about the end of April, when the temperature went down to 16° F., retarded the flights to some extent. About the first week in May all Papilio were on the wing, showing some increase over previous years, but not reaching their former abundance. P. oregonia, the one exception, showed up as well as last year, especially in the second brood. All Lycaenidae were fairly plentiful, and could be found in their usual habitats. Euphydryas anicia and Melitaea sterope were much less in evidence than in previous years. Nymphalis californica and milberti were scarce compared to last year. N. antiopa showed an increase but is never common here. By the middle of July Speyeria were plentiful, S. zerene garretti more so than in many years, with meadii a close second. The small creek valleys along the Methow River showed in general a bigger population of butterflies than in a good many years. In the higher altitudes of the Cascades, at some 4-5,000 ft., during the middle of June, hibernating Polygonia were very com-

mon, some being in excellent condition. During September at the same place very few showed up. In the same localities Euphydryas anicia and Boloria epithore, usually common, were absent. Very few Lycaenidae were seen. A few Colias edwardsi were taken; they were scarce as usual. At about 7000 ft. Erebia vidleri were old and shabby by the end of July, and were scarcer than normal. Speyeria mormonia was abundant, as well as Boloria titania rainieri. Oeneis chryxus was old by that time, and not worth taking. Colias interior was flying in good numbers, about as usual. No Parnassius were seen at all in these places, where formerly a dozen or so could be obtained in one trip. During the first week of August along the San Poil River a good many Neophasia could be seen in the tops of the pine timber, but none came in reach of the net. Cercyonis baroni and sylvestris showed a decrease compared to last year, while C. oetus could be seen in better numbers. Phalaenid moths were scarce, for the second year, and very few were taken at light. As whole, the year 1951 seemed to be a "normal" year.

Frechin reported that along the Wenatchee River, Chelan County, several days' collecting even under overcast skies, was still productive. A good series of Papilio indra was taken, on moist spots along the river and the highway. P. zelicaon was scarce, but P. eurymedon and P. rutulus were fairly common. The most common species observed was Plebeius icaroides, which gathered in quantity on moist spots, and were easily taken. A nice series of Colias occidentalis was also taken. This species was rare in 1943. Only three Pseudohazis eglanterina were seen. Polygonia were also scarce. Speyeria zerene was seen, but not captured.

IDAHO

PHALAENID COLLECTING AT TWIN FALLS (Cook). As in former seasons, Mr. J.R. Douglass operated a light trap at Twin Falls during the 1951 season. The average catch per night was the lowest in the 7-year period of operation, being 9.8 moths per night.

Of the 45 common species, 5 were less abundant than in 1950, 4 were more abundant. Moths whose populations are increasing are Euxoa olivia, E. cicatricosa, Crymodes devastator, and Anagrapha simplex. Among those with decreasing populations were Euxoa ochrogaster, which was an economic pest in 1950 and 1951, Feltia ducens, Lacinipolia stricta, and Proxenus miranda nitens.

Unusual captures were 1 specimen of Schinia cupes, 1 of Euxoa andera, 1 of Agrotis orthogonia, and 31 of Loxagrotis albicosta. The last species is somewhat of a problem on beans in that area, but rarely comes to light. More specimens were captured this season than had been taken altogether before.

BRITISH COLUMBIA

SOUTHERN VANCOUVER ISLAND (Guppy). Weather: The 1950-51 winter was close to normal. The only unusual feature was a short cold snap with some snow, at the beginning of March. As some early moths had been flying for two weeks before that, they may have been adversely affected. The spring and summer were marked by a very extraordinary drought. No rain at all fell in April, an unheard-of condition in what is usually a wet month. May rainfall was about normal. The drought set in again in June, and continued, except for one short break in July, until nearly the end of September. The most noticeable effect of the drought was a scarcity of many common moths. Butterflies, on the whole, were good. All species were out very early, but soon became worn, no doubt as a result of their being on the wing every day. It seems necessary to include here some mention of the changing conditions on Vancouver Island. It should be borne in mind that until quite recently V.I. was largely overgrown with dense rain-forest. In such an environment few butterflies can thrive. The first, and most extensive, change occurring on arrival of civilization is the logging and burning over wide areas. Later, a small part of the land is put under cultivation. Roads also provide many miles of ideal conditions for butterflies. It appears certain that clearing operations in this district are causing a very noticeable annual increase in many Lepidoptera. Most seemingly affected are Speyeria hydaspe, Boloria epithore, Carterocephalus palaemon, Euclidina cuspidea, and Caenurgina erechtea.

Following are more detailed notes on some aspects of the 1951 season: Papilio zelicaon continued to show marked increase, though it was not yet common. Parnassius clodius was very common for the third successive season. A most interesting note is the discovery of a colony of P. smintheus at 5000 ft. near the top of Mt. Arrowsmith. F.M.Brown says of specimens sent to him that they are not distinct from specimens from the type locality (Banff, Alta.). Neophasia menapia is barely holding its own. A fair number of somewhat worn males were found in July and early August. Later, when the females should have appeared, there were none of either sex seen. Oeneis nevadensis, true to form, did not show up at all. A visit to the southern end of the Island, in late April, found Euphydryas taylori very abundant. Another trip late in June turned up large numbers of Coenonympha inornata. Since I have not collected in this area before, I cannot compare with previous years. Speyeria hydaspe, from being a rather scarce species, has become nearly our commonest butterfly. Except on the West coast, and in the vicinity of Victoria, they were around wherever I collected, from sea-level up to 5000 ft., from early June until late August. Boloria epithore also continued on the increase. Of Nymphalis antiopa worn spring and summer specimens were much commoner than usual; few autumn individuals were noticed. Mitoura nelsoni, which I took occasionally in 1950, was not seen at all. Hesperiidae were plentiful; C. palaemon has in recent years become a common species near my home, probably due to grass growing on burnt-over land. A fairly large Sphingid, noted on several occasions flying in early morning and late afternoons, may herald the return of the Celerios. Unfortunately, I was not able to net any. My brother took C. lineata at Vancouver City and on the western coast of Vancouver

FIELD SEASON SUMMARY 2. NORTHWEST - concl.

Island. On the other hand, two battered specimens given to me by a neighbor appear to be Sphinx pereleganS, a species never common here. Smerinthus cerisyi was scarce after two years of comparative abundance. No Saturniidae were seen. Isia isabella and Diacrisia virginica have nearly disappeared after being pests in the light traps for several years. Diacrisia pteridis showed an increase after being nearly absent for four or five years. Arctia caia occurs sparingly, showing no ill effect of the drought. For the third successive year Phalaenidae in the main were unusually scarce. It is notable that I collected more species new to me than in previous years, although a yearly falling off would be expected. This suggests that some rare species were favored by the drought. Several specimens of Catocala were taken, probably all aholibah. In former years I was able to get only one. Phalaenidae captures of special note were: Polia radix, Zanclognatha jaccnusalis; Protagrotis obscura; Oncocnemis dunbari; O. youngi; Fishia discors; Pleroma obliquata. Caenurgina caerulea is increasing on an almost exact parallel with Euclidina cuspidea, and flies in the same localities. In Geometridae, Erannis vancouverensis was quite common at light in November, not having been taken before.

- -

Contributors: W.C. Cook; D.P. Frechin; R. Guppy; R.H. Macy.

3. ROCKY MOUNTAINS - NEW MEXICO, UTAH, TO ALBERTA

by Donald Eff
Boulder, Colorado

The report for the Rocky Mountain area this year is somewhat sketchier than usual, due to the failure of several of the resident collectors to submit their observations.

The winter of 1950-51 apparently was about standard in the northern half of this area, with the Continental Divide in the vicinity of Denver, Colo., receiving its heaviest snowfall in 53 years. However, over the Continental Divide on the Western Slope in Colorado the snowfall was only about normal in the higher mountains and the lower valleys were exceptionally dry and cold. To the south things got hotter and drier (southern Colorado), culminating in the drought conditions that plagued New Mexico to such an extent that it was necessary for that state to declare a state of emergency. The semi-arid conditions in New Mexico, followed by cold, retarded greatly the appearance of what spring species were to appear. In Colorado and Wyoming inclement weather during May and June retarded appearance of species due then. In fact, over the entire season, the majority of species were from one to two weeks behind schedule. No report was received for Alberta.

MONTANA

Neil Euting of Nashotah, Wisconsin, did some traveling in this state, and is the only collector to submit any report of conditions there. He was somewhat hindered in his collecting (aren't most of us?) by the pursuit of his occupation. He did have some excellent collecting in May in the vicinity of Missoula and Billings. The balance of the season found him more often than not the victim of the whims of the weather whenever the chance to collect did appear. This is a common malady among resident collectors of the mountainous areas. Apparently Euphydryas anicia was common throughout the majority of its range this year. Charles and Jeanne Remington remarked concerning the number of Checker-spots when they were enroute to San Francisco during June, and they offered the opinion that perhaps the reason that collectors don't take more of them is because they wait until later in the season when more species are in flight before taking trips through this area. Euting found them quite numerous in the vicinity of Missoula, during the latter part of May. Also taken were a good number of Plebeius icarioides, Glaucopsyche lygdamus, and Oeneis uhleri.

UTAH

W. Levi Phillips reports from the Salt Lake Valley and neighboring canyons of the Wasatch Range that spring temperatures averaged 3 to 5 degrees colder than in 1950, and that there were more rainy days. Many butterflies were late in appearing. Examples of earliest records are:

	1951	1950
Papilio zelicaon	May 25	April 18
Papilio multicaudatus	May 26	May 17
Papilio rutulus	May 21	May 16
Vanessa cardui	May 29	April 11

Danaus plexippus was scarce until Sept.2, when the southern migration began, continuing until Oct. 7; Nymphalis antiopa and N. milberti were scarcer than usual; N. californica was scarce; Vanessa atalanta was absent, as in the past several years; Limenitis weidemeyerii was in its usual numbers; Adelpha californica was absent, as in 1950. Papilio rutulus, P. eurymedon, and P. multicaudatus were scarcer than usual; P. zelicaon was more numerous than usual; 2 specimens of P. indra were taken. Parnassius were in normal abundance. Speyeria callippe were more abundant than usual, other species of the genus scarcer. In general the year was a poor one, but better than 1950.

On September 20 at St. George, southern Utah, the air was orange with Colias (eurytheme?); Chlosyne lacinia was present.

WYOMING

The only report from a resident collector in Wyoming is from Duke Downey, at Sheridan at the edge of the Big Horns. His report for conditions in that area is similar to that of Euting in Montana, i.e., cloudy and cool in June, with July producing some fair collecting. Speyeria showed a definite increase there. Papilios and Colias were very poor. Lycaenidae were spotty. In the moths, Catocalas were few, but there was an epidemic of one of the smaller moths (unidentified). Downey did not get a chance to collect the alpine terrain, but the Remingtons made a brief visit to the Big Horn Mts. on June 14-15. They found Euphydryas anicia and Colias philodice very abundant and fresh, with ♀♀ rare; two larvae of E. anicia were found parasitized by large Ichneumonidae. Glaucopsyche lygdamus was past its peak, but Plebeius saepiolus and Erebia epipsodea were just emerging. Overwintered Nymphalis antiopa and Polygonia spp. were numerous. On the western slope a Hesperia was numerous, the ♂♂ worn, the ♀♀ fresh. Lower down, at middle Tensleep Canyon Anthocharis sara (both sexes), G. lygdamus, and Plebeius icarioides were numerous and fresh. E. epipsodea (♂♂), Lycaenopsis pseudargiolus, Pyrgus ruralis, Limenitis weidemeyerii, and Hesperia sp. were fresh but scarce. Battered N. antiopa were remarkably common. Much lower in the Canyon, at the Fish Hatchery, there were several E. epipsodea, Coenonympha tullia, and Euchloe ausonides, the latter commonly ovipositing.

Near Upton, Weston Co., on June 13 they found Colias alexandra, E. anicia, C. tullia, Phyciodes tharos, and large numbers of Coloradia sp. all just emerging.

On June 16 in the Jackson Hole the Remingtons reported A. sara, E. ausonides, Pieris sisymbrii, C. philodice, Papilio rutulus, C. tullia, E. epipsodea, G. lygdamus, P. icarioides, P. saepiolus numerous and fresh. Incisalia eryphon, Mitoura spinetorum, Lycaena snowii, and Callophrys sheridani were much scarcer and worn. Pieris napi and Callophrys (affinis?) were fresh but scarce.

Across the Teton Mts., in Teton Canyon, they found P. napi, A. sara, E. ausonides, L. pseudargiolus, Erynnis spp., and I. eryphon were fresh and abundant. P. rutulus and P. (brucei?) were fresh and in fair numbers. Overwintered N. antiopa, Polygonia hylas, and P. satyrus were present. Malacosoma larvae were rather numerous.

COLORADO

Our reports from this state come from few collectors. Rev. Rotger, who moved to Pagosa Springs from Durango, was collecting for the most part in new territory and was handicapped in his report because he was therefore unable to make any comparisons; also his collecting schedule was irregular this year. Minor sent an excellent comprehensive report on collecting conditions in Mesa County in the west-central sector. The only other area to be reported is the north-central area, from which comes the author's report. He is joined in the report for this area this year, with some excellent observations made by Leuschner of Oak Park, Illinois, and the Remingtons. Mr. Leuschner's report on the moths is particularly gratifying. He collected in Colorado from July 14 to 23.

NORTHWESTERN COLORADO. The Remingtons collected here on June 29. Near Mt. Harris, Routt Co., the outstanding captures were 5 ♂♂ (worn) of Satyrium fuliginosa. Species which were abundant and fresh there were: Pieris protodice, Colias philodice, Oarisma garita, Lycaena helloides. Vanessa cardui, Pieris rapae, Pyrgus communis, and Speyeria sinope were fresh but scarcer. Coenonympha tullia and Plebeius icarioides were abundant and worn. In the famous locality on the western slope of Rabbit Ears Pass, Boloria toddi was again found. ♂♂ of Speyeria sinope and S. atlantis were just emerging, and no other species were seen. Papilio eurymedon and P. rutulus were common and fresh, as usual. Only one Limenitis weidemeyerii (a ♀) was found, where the species normally abounds. In great abundance were Lycaenopsis pseudargiolus, Everes amyntula, Thorybes sp., and Phyciodes gorgone. Less common, but fresh, were C. tullia, Glaucopsyche lygdamus (some worn), P. icarioides, Erynnis spp., Euchloe ausonides, Pieris napi. Several Anthocharis sara (worn ♂♂) were found. In Grand County, six miles east of Muddy Pass, where Boloria toddi was first taken in 1949, a fresh B. toddi was found, as well as several fresh E. epipsodea, C. tullia, and P. icarioides and a cluster of young Pseudohazis larvae.

WEST-CENTRAL COLORADO (Mesa County). The winter was cold and dry with little snow at the lower altitudes, but about normal at the higher elevations. Spring species in the lower elevations appeared about on time - the first of April. But then, instead of the weather warming gradually, the temperature remained at about the same level and then began to get colder, resulting in the failure of flora to develop, drying up the grass, and retarding the appearance of insects. As a result, the spring collecting, which started out promisingly enough with the appearance for the first time in years of Megathymus yuccae coloradensis, was a dismal failure, with even the two most plentiful species, Melitaea acastus and Euphydryas anicia below average, and many of the other usual species, such as Melitaea fulvia, Phyciodes barnesi, Pieris beckeri, P. occidentalis, and P. sisymbrii entirely missing. A few Euchloe ausonides did show. Papilio were practically non-existent; only two badly damaged indra minori were seen, and only a few P. rutulus. Plebeius melissa was in the same class with the Papilios, and Limenitis archippus and Epargyreus clarus, both of which are usually plentiful, failed to appear. Along about the middle of June the weather jumped from cold spring into a very hot and dry summer, also not beneficial to the various butterflies. However, Cercyonis masoni was seen in fair numbers at its type locality, Spring Canyon, and also in Pyramid Canyon. It appears the last of July and first part of August. Two species turned up in abundance, Coenonympha tullia ochracea and Parnassius smintheus. C. ochracea apparently was making a comeback after a two-year near-oblivion period, and Parnassius, usually scarce there, was abundant for the first time in

FIELD SEASON SUMMARY 3. ROCKY MTS. - cont.

the history of Minor's collecting. Oeneis chryxus was back after a three year absence. Skippers as a whole were very, very poor. Moths were about as scarce as the bulk of the butterflies, some like Smerinthus cerisyi, Hemaris thetis, Gnophaela vermiculata, and Nemeophila plantaginis were entirely absent. Even Plataea trilinearia was quite rare. In review, Minor considers this the poorest season for collecting since 1925, at least in the lower elevations. He had no opportunity to collect in the alpine areas.

NORTH-CENTRAL COLORADO. In this section I am assisted by the report of Leuschner, who collected on several of the mountain passes in this general area, and the Remingtons. Also, I was privileged to collect for short periods in the company of B.H. Weber of Burbank, California, and H.A. Freeman of Garland, Texas, both of whom visited here for a few days. Weber came through Utah and took some nice material, but apparently did not get it all identified in time to submit a report. When he left here he went via Glenwood Springs and then south to Ouray and Silverton, with no good collecting being encountered along the way. Freeman went straight south from Denver to New Mexico. Aside from what he collected around here, he noted in his report that Strymon godarti was fairly common in the vicinity of Colorado Springs. Mention of his other captures will be made from the corresponding area through which he travelled. The peak of the collecting was past at the time of his arrival August 12, but it was a revelation to me to see a real skipper man pick them up where I never even saw them. Near Tolland he took a pair of one not too common here, and which was new to me, Polites sonora utahensis.

On the eastern side of the Rockies we had a late wet spring. Collecting, ordinarily beginning the first of April, did not start until the 27th of that month because of late snows and spring rains. Even then there were only a couple of good days and then more inclement weather that delayed things until the second week of May. However, from that point on, with the abundant moisture that produced a profusion of flowers and covered the land with a carpet of green, collecting was better than for several years. Euchloe olympia was quite common for the first time. Others present at this time of the year in more than normal abundance were: Callophrys apama, Oeneis uhleri, Plebeius icarioides, Phaedrotes piasus, and Erynnis afranius. Callophrys sheridani seemed to be about the only casualty and this was undoubtedly due to the inclement weather during the first two weeks of April, its normal flight period. Encouraging signs were noted in the reappearance of a few Incisalia schryverii, a slight increase in the scarce iroides, better than average numbers of Pieris sisymbrii, the reappearance of Phyciodes barnesi, and the first capture of Incisalia polios in the Boulder vicinity. Anthocharis sara was still very scarce, only a couple being seen. Philotes enoptes had a very good year, as did Euphydryas capella. On June 24 I started for the bogs at Tolland only to find the bridge washed out, so went to Caribou to see if I could find there Boloria frigga sagata; I saw and caught one very fresh specimen, but was amazed to discover B. freija out in some numbers. However, nearly every specimen was worn, with only a couple of the females appearing in good condition. The fact that B. freija apparently appears prior to B. frigga sagata (at least at this altitude), which is generally regarded as the earliest of the higher elevation Boloria, came as a distinct surprise, and goes to prove that it is well to go to your favorite haunts at other than the usual time. I had found B. freija before, but only at higher elevations and at a later date.

The collecting below 9000 ft. continued to be fairly good during June with an increase in nearly everything except Speyeria halcyone and Limenitis weidemeyerii. Speyeria meadii was more plentiful than I've ever seen it, and S. edwardsii was seen in some numbers again after a two year absence. Skippers numbers were pretty good, with Hesperia viridis, Atrytone ruricola, Oarisma garita, Polites themistocles, and P. manataaqua among the most common. Melitaea palla was still scarce and M. arachne continued to be entirely absent. Not since G.W. Rawson and I found a second brood in 1948 have I seen an arachne. Remington took a fresh ♂ Asterocampa leilia on July 2. The alpine collecting, which begins in July, might have been fair had it not been for the strong winds that continually plagued the tundra. Many of the species could have been in more abundance than was indicated by the number of specimens seen, because the wind was blowing so hard that it was almost impossible for any species to fly. Leuschner collected on many of the passes in the vicinity, on most of which I was unable to collect. In Rocky Mountain National Park he found Cercyonis oetus abundant, as it was at Boulder. Others that he found common in the meadows of the lower elevations were Colias alexandra, Parnassius smintheus, Lycaena heteronea, and Coenonympha tullia. He also found Plebeius acmon common there, a condition not found in the immediate Boulder vicinity. Pseudohazis sp. also commenced to fly in the meadows there on July 21. In the higher elevations, near Tyndall Glacier he found Colias meadii quite common, as it appears to have been throughout most of Colorado. Erebia magdalena was about as numerous as usual, and just as impossible of capture. He also found Euphydryas eurytion near Hallett Peak, a species that I did not see at any of the other alpine collecting areas that I visited. He also found Oeneis (not yet positively identified) which are probably lucilla or brucei, or both, fairly common near Tyndall Glacier and again at Loveland Pass. The spots that I visit annually in search of Oeneis, Mt. Evans, and Niwot Ridge near Navajo Peak, showed them still entirely absent, as they have been for the past couple of years. Weber and I found Plebeius shasta minnehaha plentiful at timberline on Niwot Ridge in spite of gale-like winds. Later I discovered a larger colony of them near James Peak in Boulder County. Leuschner had good collecting near Breckenridge with Erebia epipsodea, Lycaena helloides, Pieris napi, and a number of the Blues. The Blues as a whole seemed to be greatly increased in numbers this year. L. helloides I also found plentiful while collecting at Tolland with Freeman, but P. napi and E. epipsodea were nearly absent. The

disappearance of these last two is probably the result of a flood that swept the bogs at Tolland. On Hoosier Pass, Leuschner found Erebia callias and Boloria helena abundant. Also there seemed to be quite a few B. freija there. In the lower elevations, Speyeria hesperis and S. ethne were common, as was Cercyonis olympus. Strymon saepium was more plentiful than for a couple of years. Strymon melinus atrofasciata put in its appearance after an absence of several years. The season closed with Hesperia ottoe pawnee and Phyciodes camillus about normal in numbers.

In the moths I am indebted entirely to Leuschner for the only report, an excellent one. Celerio lineata was uncommon this year. He collected in Big Thompson Canyon at the Park entrance, at Fall River campground, near Loveland Pass, and just above Breckenridge. About 95% of all moths collected were Geometridae or Phalaenidae. There were a few Arctiidae, 4 species of Notodontidae, and 9 species of Lasiocampidae. Breckenridge supplied 4 specimens of Apantesis determinata, Malacosoma americana, Nemeophila plantaginis (very common), many Phalaenids, no Catocala, and many Geometridae, mostly of the Larentiinae. About 250 moths were taken each night of the two spent there. Nothing different was taken below Loveland Pass, and only a total of about 30 specimens in all. Fall River had some species not taken elsewhere (C. perlata, for example) but only a total of about 30 specimens. Big Thompson was quite different from the other three places. Hesperumia sulphuraria, Epiplatymetra coloradaria, and Apantesis nevadensis were the commonest. The only other Arctiid was Arachnis picta. No Sphinx or Notodontidae were found.

A brief résumé of the various species by genera seems to show the following for this area of Colo.: Papilio poor (although the Remingtons found P. indra, P. multicaudatus, and P. rutulus numerous on July 1); Parnassius better because of the return of hermodur to the highest elevations; Anthocharis sara nearly absent; Euchloe good, as were the Colias; Neophasia menapia very poor, but better than at any time since 1948; Pieris about normal, poorer in a few places; Danaus plexippus more common than previously; Coenonympha very good; Cercyonis good; Oeneis spotty, rather poor as a whole; Erebia poorer than usual, with E. magdalena and E. callias the only species to hold their own; Speyeria definitely on the increase, aside from S. halcyone, always scarce here. Boloria freija was more common than usual, B. frigga sagata very scarce, B. helena common, B. selene scarce, B. eunomia alticola not too plentiful; Euphydryas very good for capella and apparently the same for E. eurytion, at least in the right spots. Melitaea poor, with M. arachne absent. Phyciodes about normal except tharos; Polygonia scarce; Nymphalis and Vanessa normal; Limenitis weidemeyerii poor, very few being seen; Apodemia nais, reappearing in small numbers; Strymon fair, aside from titus and californica; Mitoura with M. spinetorum missing entirely and several fresh M. siva on July 1; Incisalia, improving, but very little, with the exception of I. eryphon, which remained common; Lycaenidae: about normal, with the Blues having an excellent year. Thorybes not too common; Pyrgus centaurae and communis, both fairly common; Erynnis good, especially afranius and pacuvius; Butleria scarce, as usual; Oarisma garita abundant; Copaeodes minima not seen; Hesperia good, with uncas and viridis showing the largest gains; Ochlodes poor; Polites very good; Poanes taxiles rather scarce; Atrytone ruricola plentiful; Amblyscirtes scarce.

SOUTHERN COLORADO (Rotger). The collecting does not appear to have been of the best because for the second consecutive year it was very dry, and it undoubtedly did have a definite effect on both the numbers and species to appear. Collecting started in May and several Incisalia eryphon were taken, but only a couple each of Callophrys, Pieris napi, and Anthocharis sara. In June at Mesa Verde he found one Megathymus yuccae, and only a couple of others such as Papilio multicaudatus, Melitaea acastus, Phyciodes barnesi, and Euptychia henshawi. The last part of June Rotger collected at South Fork where he took several Megathymus streckeri, a few Eumenis ridingsii, and Oeneis chryxus. Euphydryas carmentis and Speyeria edwardsi were taken near Pagosa Springs. In July and August he found several specimens of Speyeria cybele carpenteri, S. atlantis, and S. mormonia. Boloria selene was common at one place. He also took Strymon sylvinus, S. titus, Tharsalea virginiensis, some Lycaena rubidus, Apodemia nais, and noted a fair number of Danaus plexippus. Polygonia and Neophasia menapia were scarce here also. In the La Garita Mts. he found Parnassius smintheus, Erebia epipsodea, and one Callipsyche behrii. North of Slumgullion Pass several Colias meadi were taken, as well as Erebia callias and Parnassius. No Oeneis lucilla were even seen. About the middle of August H.A. Freeman collected through this area on his way back to Texas and found Strymon godarti in the vicinity of Raton Pass. Here also he took Strymon titus, which apparently was more plentiful in the southern part of the state than elsewhere, Pholisora mejicanus, Hesperia harpalus ochracea, Pyrgus communis, and Epargyreus clarus. P. mejicanus was also taken near Trinidad as well as one specimen of Apodemia mormo.

NEW MEXICO

Our report for this state comes mainly from O.D. Standard of Belen. Freeman, still on his way back home, found one specimen of Oarisma edwardsii at Jemez Springs and found Hesperia uncas rather common in the eastern section of New Mexico. Conditions in New Mexico, as previously mentioned, were very poor because of the drought. The very mild winter, with cold, late spring made collecting conditions unfavorable until near the middle of July. During this period even the common species failed to appear. Everything was very late, but a number of species were found which had not appeared for a year or two, among them Nathalis iole, Chlosyne lacinia and Phyciodes tharos. Phoebis eubule also appeared after an absence of three years. Libytheana bachmanii became scarce after last year's large numbers. Celerio lineata was plentiful here. Sphingidae and Catocala were scarce. Papilio polyxenes made an excellent showing this year. Always present in low numbers, this year it was common. Collecting for the season though, was very poor.

FIELD SEASON SUMMARY 3. ROCKY MTS. - concl.

NOTES OF SPECIAL INTEREST. New Mexico was invaded by hordes of caterpillars, (apparently Sphingidae) numbering in the millions. At one place they were believed to have a 20 mile "front". They made Highway 66 slippery and dangerous for driving because of their crushed bodies; they ruined the motel business in a few places and brought out the forces of the city and county departments to do them battle. Most of the concentration was in the vicinity of Albuquerque. From newspaper photographs they were apparently Celerio lineata.

Phoebis eubule, taken only occasionally in Colorado, was seen in more numbers this year than at any time previously. Standard reports their reappearance in New Mexico after a three year absence. Rev. Rotger saw several in southern Colorado, Leuschner saw one on Hoosier Pass, and I saw several in Boulder County, on the foothills of the Front Range, at Tolland, and at Caribou. I have one specimen captured on the top of Arapahoe Pass at an altitude of 11,500 feet.

The famous bogs at Tolland received a further serious set-back this year when high waters during the middle of June flooded the area. To top it all, the dam of man-made Teller Lake in Mammoth Gulch above the bogs burst and further inundated the area with a solid wall of water, depositing a layer of silt over everything and washing out many places, uprooting trees, washing out bridges, roads, making a general mess of things, and probably ruining collecting for several years to come.

The most unusual records for these states were: Downey's Wyoming Catocala manitoba; Rotger's Libytheana bachmanii; Remingtons' Asterocampa leilia and Satyrium fuliginosa; the several Phoebis eubule, and Renk's specimens of Oeneis jutta reducta from near Fraser, Colorado.

- -

Contributors: D. Downey; N.A. Euting; H.A. Freeman; R. Leuschner; W.C. Minor; C.L. and J.E. Remington; J.J. Renk; B. Rotger; O.D. Standard.

4. GREAT PLAINS - TEXAS AND EASTERN PLAINS OF ROCKY MTS. STATES TO SASKATCHEWAN AND MANITOBA

by H.A. Freeman
Garland, Texas

In the southern part of Area 4 the spring was characterized by being wet and rather cold; however, the summer was marked by a very severe dry spell that lasted into the fall. The southern part of Texas had very little rain at all during the summer and thus the butterfly population suffered. Conditions were not as bad over the central and northern part of the area. The only report received from Canada was from C.S. Quelch, and he indicated that the climatic conditions were about average; however the butterfly collecting was below average. W.J. Reinthal, in Norman, Oklahoma, indicated that conditions were about average in Oklahoma.

NORTH

Quelch reported from Transcona, Manitoba, as follows: The first three weeks of April were cold, with little snow or rain. From April 23 to May 28 the weather was warm and dry. The rest of the season was rather uniformly cool. It was dry until August. In August rainfall was average. September was wet. Collecting was very poor, even worse than in 1950. In fact his records show a steady decline in abundance year by year since 1948, which was a very good year. Coenonympha inornata and Euptychia cymela are the only two species consistently plentiful in all years. The winter of 1950 was an average winter, no extremes at all. Most species were appearing at about their normal time.

The following details are from Quelch's records and show abundance for four years, 1948-51 (A - abundant, B - good, C - fair, D - few, E - scarce, F - none):

Species	1948	1949	1950	1951
Lyc. pseudargiolus	C	D	saw 1	F
Gl. lygdamus	A	A	E	E-
Pl. saepiolus	A	C	E	E
Pl. melissa	C	D	D	F
Ev. amyntula	B	C	F	C
Inc. polios	A	C	C	C
Inc. augustinus	A	C	F	E-
Inc. niphon	A	C	F	F
Ly. helloides	C	D	D	C
Ly. dione	A	E	F	C
Ly. thoe	C	C	C	C
St. titus	A	C	E	F
St. edwardsii	A	A	F	F
Ph. ismeria	B	E	none	D-
Ph. nycteis	A	B	E	E
Ph. tharos	A	C	E	E-
Bol. toddi	B	E	E	E
Speyeria spp.	A	C	E	E-
Van. cardui	C	A+	none	none
Coe. inornata	A	A	A	A
Eup. cymela	A	A	A	A
Cer. alope	A	A	C	C
Col. philodice	B	E	E	C
Col. eurytheme	B	E	E	F
P. rapae	A	C	C	A
P. occidentalis	10 Aug.1951 (4), first in 7 yrs.			
Er. icelus	A	C	E	E
Er. brizo	A	C	E	E
Er. juvenalis	A	C	E	E
Th. pylades	A	A	E	E
Pyr. communis	A	C	D	F
Pol. themistocles	C	C	E	E
O. garita	B	C	E	C

Remarks on summary:

The Satyridae seem to be the only group that retained its abundance through the four period. The only apparent reason for the drop in abundance between 1948 and 1949 is the fact that the fall of 1948 and spring of 1949 were very dry, April 1949 being a record dry month with only .016" precipitation. 1950 had a cool summer. The area covered in this report is largely that around Transcona, where Quelch collected regularly on an average of ten hours a week. He also collected at Birtle, Manitoba, from July 15 to 30. Birtle is 200 miles west of Winnipeg. Speyeria and B. toddi flew in fair numbers, but other species were very scarce. He also collected at Kenora, Ontario, Aug. 4 and 5. Collecting was poor there also; only a few Hesperiidae were taken.

In South Dakota the Remingtons collected in Custer County on June 12-13. They reported: Euchloe olympia, fresh; Pieris sisymbrii, numerous less fresh ♂♂; Colias philodice, few, fresh; Euphydryas anicia, numerous and fairly fresh; Vanessa atalanta, several, fair; Nymphalis milberti, scarce; Incisalia augustinus and I. polios, both fresh and abundant; Glaucopsyche lygdamus, fresh but rather scarce; Lycaeides sp., scarce; Pyrgus communis, numerous, fair; Isturgia sp., very abundant, fresh; Hemaris diffinis, one, fresh.

MIDDLE

Ronald Leuschner, Oak Park, Illinois, collected at Chappell, Deuel Co., Nebraska, July 22, and found the moths fairly swarming around a well-lit ice-cream stand. Schinia was the most abundant group: about 5 species were represented, with jaguarina by far the most common. There must have been over a hundred specimens on and around the building. Other families besides Phalaenidae were: Sphingidae, about 3 Phlegethontius sextus; no Notodontidae noticed; a few Arctiidae, including 2 specimens of Euchaetias bolteri and 3 very small Apantesis (blakei?); the only Geometridae noticed was a Euchlaena obtusaria.

On June 9 the Remingtons found: two Danaus plexippus at Shelton, Nebr.; at Grand Island Papilio glaucus, Epargyreus clarus, and Everes comyntas fresh but scarce, and several worn Vanessa atalanta ♀♀; at Ogallala Lycaeides sp., Pholisora catullus, and Pyrgus communis numerous and just emerging. On June 10 in Banner Co. they found Mitoura siva ♂♂ very fresh, V. atalanta numerous, Lycaeides sp. and Hemaris diffinis scarce and fresh, and Euptoieta claudia less fresh. On June 11 in Sioux Co., Euphydryas bernadetta was abundant but many were worn; Lycaeides sp., Oeneis varuna, and Colias philodice were fresh but scarce.

In the Kansas-Oklahoma area collecting was on an average with past years. Climatic conditions were about average; thus most of the species appeared at about the usual time. Megathymus yuccae stallingsi again produced a good flight. Strymon ontario autolycus and S. falacer were abundant in the Norman area, together with Erynnis juvenalis and E. horatius.

SOUTH

On May 13 Howell Daly and I collected in the Sherman to Gainsville area and found several interesting species. Thorybes confusis and daunus were fairly common as was Achalarus lyciades. These three species have never been found abundantly in Texas previously. There were several other rather good species collected in that area, Strymon ontario autolycus, Amblyscirtes belli, Polites themistocles, and Erynnis baptisiae.

During March, Daly and I found the collecting around Tyler in eastern Texas about the same as during the past three years. The small colony of Incisalia hadros in the Tyler State Park was still in evidence as about two dozen specimens were collected. Incisalia henrici was more abundant there than at any previous time during my observation of that area. About a dozen specimens of Megathymus yuccae were collected either on the wing or in the pupal stage in the roots of Yucca louisianensis. Several specimens of Hesperia metea licinus were collected, as well as Erynnis martialis. The abundance of Papilio was about average as P. philenor and P. glaucus were common.

In the Dallas area Daly and I found collecting on an average with past years. During March Incisalia henrici and Megathymus yuccae were fairly common. Amblyscirtes belli and A. vialis were common during May and June. Cogia outis was rare as compared with past seasons.

During October W. S. McAlpine made a collecting trip to the southern part of the state. He tried to locate specimens of Lephelisca rawsoni at New Braunfels, as I had previously tried to do, but to no avail, as the area around New Braunfels had been very dry all during the summer. At Del Rio he found Lephelisca australis very abundant. Several other interesting species were collected.

During the last of October W. J. Reinthal made a collecting trip along the Rio Grande from Laredo to Brownsville. Among the interesting species that he collected were several specimens of Strymon pastor. Other things collected in that area corresponded with specimens that I had found to be fairly constant in that area.

During November Lowell Hulbirt collected around Brownsville and found that Lasaia sessilis, usually present, was absent from that area, however he found that Strymon pastor was more abundant that at any other time that he had collected there. He also caught some specimens of Atrytone eulogius, which has always been a rare and fine catch.

During August I made a collecting trip to west and south Texas with fine results. In the Alpine area I found collecting very good as the autumn rains had already started, and in the canyons and low areas many of the familiar species were present. A few specimens of Lephelisca were found near a stream of water eleven miles north of Alpine. Achalarus casica as well as Thorybes pylades were abundant. Several specimens of Papilio multicaudatus were observed as well as P. cresphontes. In the Chisos Mts., larvae of Megathymus

FIELD SEASON SUMMARY 4. GREAT PLAINS - concl.

mariae were fairly common in Agave lecheguilla. There were few Lepidoptera on the wing in the Chisos Basin as conditions there were very dry. Five miles south of Marathon, near a large spring, several specimens of Ancyloxypha arene were collected as well Eurema nicippe and Nathalis iole. At Del Rio, Lephelisca australis was very abundant, as fifty-five specimens were collected in a half hour. Lerodea julia and Amblyscirtes celia were on an average with past years. A small colony of Megathymus smithi was discovered east of San Antonio. I had been searching for this colony for the past fifteen years and thus was happy to discover it. Because of the extreme dryness other Lepidoptera were scarce near San Antonio. At New Braunfels I searched for Lephelisca rawsoni but saw none because the small canyon where I had previously collected this species was completely burned up by the drought.

Contributors: H.V. Daly; L.H. Hulbirt; R. Leuschner; W.S. McAlpine; C.S. Quelch; W.J. Reinthal; C.L. Remington; D.B. Stallings.

5. CENTRAL - MISSOURI TO WEST VIRGINIA, NORTH TO ONTARIO

by P.S. Remington, Jr.
St. Louis, Missouri

This year replies were received from 25 collectors in this zone, a much better return than last year. As a general summary, it might be said that collecting was much better this year than last, even though there were very heavy and prolonged rains throughout much of the zone in the spring and early summer. Papilio were perhaps less common than in other years, but most other butterflies were fairly abundant. For the moths, there seems to be pretty definite agreement that Saturniidae and Sphingidae are becoming less common year by year, but Noctuidae, Geometridae, and the microlepidoptera remain plentiful.

Starting with the northern tier of states, all correspondents agree that the winter was very severe, temperatures went down to -52° F. at Chippewa Falls, Wisconsin, with heavy snowfall. In general the spring was cold and wet, a condition which persisted into the summer, and there was an early fall freeze.

MINNESOTA

Tveten, from Kiester, found the summer collecting very poor. While this may be due in part to the cold weather, he thinks it may be due also to the extensive weed spraying. He has noticed a steady decline of butterflies in southern Minnesota in recent years. Pieris rapae and Colias philodice were about the only species noted in this predominantly agricultural area. On a trip to the north, around Cook, on Aug.3, he found Boloria titania grandis very abundant on swampy roads through dense woods, and also found Nymphalis antiopa, N. j-album, Colias interior, and Pieris napi. He caught one specimen of Feniseca tarquinius, two Lycaena epixanthe, and saw many worn Speyeria atlantis.

Merritt, of Kentucky, also collected in Minnesota this summer. On August 26, between Hibbing and Big Falls, he collected in addition to those species reported by Tveten, Cercyonis alope, Danaus plexippus, Speyeria aphrodite, Boloria selene, B. toddi, Polygonia comma, P. faunus, P. progne, P. gracilis(?), Nymphalis milberti, Vanessa atalanta, Limenitis arthemis, L. archippus. He found the dominant butterflies to be L. arthemis, N. milberti, and the Polygonias. This dominance continued into Ontario, but both Nymphalis became even more abundant.

WISCONSIN

Four collectors reported from this state. Sieker found 1951 very much like 1950. Glaucopsyche lygdamus is becoming a little more common at Madison. The usual Erynnis were not found. Colias was common from early May on, C. eurytheme being dominant at first, but C. philodice outnumbering it five to one as the season progressed. In Door County Plebeius saepiolus reappeared after an absence of 13 years. Three species of Strymon were abundant this year - S. acadica, S. edwardsi, S. falacer. Pieris napi was taken sparingly, flying with P. rapae which seems to be invading the coniferous forests too. The usual satyrids were about as common as usual, Nymphalidae not so common. Sieker found Danaus plexippus very abundant this year, but was not able to observe migration.

Of moths, Sieker reports the lilac and grape feeders (Sphingidae) practically absent. In June and July Ceratomia undulosa was the dominant Sphingid and there were some Smerinthus jamaicensis and Cressonia juglandis. One notable capture was several Sphinx eremitus, the first seen in ten years. Saturniids were almost lacking, just a few Hyalophora cecropia and Antheraea polyphemus. Catocala had an interesting season: two rarities taken were C. semirelicta and C. angusi; also taken were C. cerogama, C. briseis, C. relicta, C. retecta, C. unijuga, C. nuptialis. A curious fact was the absence of C. cara, formerly half the season's catch of Catocala.

Koerber, collecting in the eastern part of the state, reports that the severe winter was followed by a scarcity of the following species: Speyeria cybele (scarce and small), Limenitis astyanax, Papilio glaucus, P. polyxenes, and Vanessa cardui (both the latter missing). The Monarch migration started in his area in mid-August and continued to its climax in early October. His most unusual catch was a female Limenitis arthemis near Plymouth on Sept.3. It

is seldom found so far south in Wisconsin.

Arnhold, in more northern Wisconsin, found Colias philodice and C. eurytheme as plentiful as usual, but Pieris napi - usually a rarity - was more common than P. rapae. He recalls seeing a few Euchloe olympia in May. Near Hayward he took a number of Limenitis arthemis and saw Boloria selene. Moths seemed to be scarce. He caught Catocala briseis on Sept.3 and raised a few C. amestris from the larva.

MICHIGAN

Five collectors responded. Beebe, at Ecorse, reports that the first half of the collecting season was poor but the last half good, giving an average year. A procession of Papilio appeared, perhaps as migrants, as follows: P. glaucus on May 24, P. polyxenes on May 25, and P. cresphontes on June 29. A worn specimen of Danaus plexippus was seen on June 10 and a fresh one on June 23. Southward migration began on July 29 and continued to Oct. 25. Eurema lisa, a rarity this far north, was seen on Aug. 20. Beebe found the moth collecting very good this year with several new state records established. The appearance of some species known only from Colorado was noteworthy. One of the features of this year was the infestation of the forest tent caterpillar, Malacosoma disstria in a broad belt from Minnesota through Wisconsin and Michigan and into northern Ontario. Railway trains were delayed as the locomotives could not gain traction on account of the bodies of the crushed larvae and auto travel was also dangerous (see Life magazine). This recalls a similar outbreak of Hyalophora cecropia in Wayne County, Michigan, in 1933-35.

Nielsen collected extensively in Lake, Osceola and Mecosta counties in the north central part of the lower peninsula. Three species of Incisalia were taken in May: I. irus, I. niphon, I. augustinus. Also Erynnis icelus, E. juvenalis, and Hesperia metea (only one). One specimen of Oeneis chryxus strigulosus was taken in open jack pine plain on May 23 in Lake county. On June 15 he took Lycaeides argyrognomon, Papilio glaucus, Euptychia cymela, Erynnis martialis, Papilio troilus, Melitaea harrisii, Hemaris thysbe. In Osceola county in early July Nielsen took Lycaena thoe, Strymon liparops, S. acadica, Lethe portlandia, L. eurydice, Euphydryas phaeton, Polites peckius, Atrytone logan, Feniseca tarquinius, Ceratomia undulosa. On July 23 he observed Strymon titus, S. liparops, Pieris protodice, Lycaena phlaeas, Lycaenopsis argiolus, Wallengrenia otho, Atrytone ruricola. From July 10 to August 23 Speyeria cybele, S. aphrodite, and Boloria selene were numerous. Nymphalis milberti was seen in great numbers on August 9 resting on thistle and goldenrod. Also very common was Everes comyntas. Hesperia leonardus was abundant in late August, Papilio marcellus very scarce.

In Mecosta county on June 17 Nielsen collected Hesperia sassacus, Poanes hobomok and its dimorphic female, Danaus plexippus, and one male Hyalophora promethea. On July 4 he collected Cercyonis alope nephele, Lethe eurydice, Phyciodes tharos, and Polites manataaqua. On Aug.11 one Strymon liparops was seen, also Pieris napi. Sugaring at Chippewa Lake in late August produced Catocala antinympha, C. relicta, and C. concumbens. A day of collecting in Lenawee County July 14 yielded Hemaris diffinis, Papilio marcellus, Paonias myops, Smerinthus jamaicensis (last two at light). On Oct.12 in Montcalm County Nielsen took Lycaena helloides and Pyrgus communis.

Voss collected in Emmet and Cheboygan Counties. He made some studies of Incisalia during the middle of May in the latter county and found I. augustinus, I. polios, and I. niphon all common on the jack-pine plains, I. polios and I. augustinus common in dry aspen woods, and augustinus also found in sphagnum bogs. Two new records for Cheboygan County were Glaucopsyche lygdamus and Pyrgus centaureae on May 13, the latter in a sphagnum bog. The summer seemed abnormally cool and wet. Colias interior was very abundant, and he took an apparent hybrid female between between C. interior and C. philodice. Lycaena epixanthe was common in bogs in July. Hesperia laurentina common near Mackinaw City in late August along with Strymon liparops and S. falacer (the last two rare). Danaus plexippus was at least as abundant as the preceding season. Voss, like Nielsen, reports Nymphalis milberti to be very common this year. Apparently it was a milberti year. Euchloe olympia was a new record for Presque Isle County on May 14.

Clench, collecting near Ypsilanti, reports that collecting was much better this year than in the past three years. More species and larger numbers were observed, many of which were only rarely encountered before or not at all. Emergences were roughly on time, the most notable exception being Thorybes pylades, which was a full two weeks early. Clench's observations are so helpful that they are here given in full and might serve as a model for other collectors who report on a succession of years in the same area:

1. Species appearing earlier than usual, by about 1 week, except as noted, with their observed frequency: Colias philodice (early by only 3-4 days if at all; about usual numbers); Strymon falacer (very common, about as in 1950); Strymon caryaevorus (slightly commoner, but still very scarce); Everes comyntas gen. I (commoner than usual); Thorybes pylades (early by 2-3 weeks, about usual numbers).

2. Species appearing on time, with frequencies: Pieris protodice gen. II (commoner than usual); Lethe portlandia (commoner); Speyeria cybele (commoner); Strymon acadica (commoner); Lycaenopsis argiolus gen. I (commoner); same, gen. II (usual numbers); Everes comyntas gen. II (commoner); Lycaena thoe (commoner); Thymelicus lineola (commoner, about equal to numbers in 1948); Polites peckius (commoner); Pholisora catullus (not seen in area reported until about 2 weeks later than normal, but in an adjacent county was seen on time).

3. Species appearing later than usual, all by about one week, with frequencies: Pieris rapae gen.I (commoner? - less than 1948, however); Cercyonis alope (commoner); Euptychia cymela (commoner); Lycaena helloides, gens. I and II (more than '49 and '50, less than '48); Poanes hobomok (usual numbers).

4. Other species, not reported above, scarcer than usual: Papilio polyxenes; Lethe eurydice.

5. Other species, not reported above, more abun-

FIELD SEASON SUMMARY 5. CENTRAL - cont.

dant than usual: Ancyloxypha numitor (not observed before); Boloria toddi (absent in most years); Erynnis sp. (usually very scarce or absent, several taken, more seen).

6. Species normally present, but absent this year: Pieris protodice gen. I (though gen.II was observed, see above); Strymon melinus and S. liparops (never anything but rare, their capture is more an accident than anything else).

7. Miscellaneous observations and noteworthy captures: Strymon acadica, fairly common in a newly found field; especially interesting was the rather large number of mated pairs (4-5 of them, late P.M., July 22); Atrytone logan (first record for area, several between July 15 and July 22); Speyeria aphrodite (first record for the area, perfect, July 24); Lethe portlandia was much more abundant than ever before seen here or elsewhere; Euptychia cymela appears to have a partial second brood here, as over the last four years specimens taken around July 1 are quite perfect, long after the insect has been flying; Limenitis archippus female and L. astyanax females were both seen to oviposit on the same Populus tree.

P.S. Remington, returning through the upper peninsula from a trip to Alaska, observed a fresh Nymphalis j-album near Iron Mountain, on August 4.

ONTARIO

Romine visited the Parry Sound district July 15-23 and enjoyed taking some unfamiliar species: Pieris napi, Speyeria atlantis, Cercyonis alope nephele, Polygonia faunus, Limenitis arthemis (all battered), and the moth Ctenucha virginica.

Merritt collected briefly in Ontario in late August. He noticed especially the great abundance of Nymphalis milberti. "Wherever flowers were blooming by the roadside, milberti could be had by the dozens." Near Rushing River he took a pair of Lycaena helloides, a worn Strymon titus, and a worn Erynnis persius (?), the only skipper he saw in Ontario.

OHIO

Mrs. Chase reported rather fully on collecting in Richland, Marion and Crawford counties. As in previous years, she has successfully reared many species of moths and butterflies. She found that many of the formerly common Saturniids and Sphingids have become rare or absent in her area. Hyalophora promethea had a rather good summer; Actias luna was scarce. On Oct.12 a neighbor brought to her a live female Thysania zenobia, a rare catch. The Chases and Romine sugared on Sept.3 in Marion County and took Catocala vidua, retecta, relicta, amatrix, cara, angusi, epione, paleogama, innubens, and others. Romine notes that "in spite of the worst winter here on record (1950-51) the Catocala seemed quite normal in number of species and specimens", and Mrs. Chase also notes that "1951 was a fairly good summer following a severe winter in contrast to almost no bugs in 1950 following a mild winter." Perhaps the answer is that the severe winter killed off the enemies of Lepidoptera.

Mrs. Chase succeeded in rearing larvae of Papilio marcellus and noted a slight difference in some of the larvae resulting in two kinds of pupae - brown ones which hibernated, and green ones which emerged in 14 days, the summer form with long tails. A notable catch for Ohio was several Achalarus lyciades in late June, a new record for all three counties. At the same time she found Melitaea nycteis, Lethe eurydice, Lycaena thoe, Strymon titus. In an extensive swamp in Troy Township, Richland County, Lethe eurydice was swarming, as well as Euphydryas phaeton. There is no Turtle Head (Chelone glabra) in this swamp, but larvae were found on Pentstemon. All were parasitized. Nymphalis milberti was very common here too. N. antiopa was scarce, but quite common were Speyeria cybele, S. aphrodite, Boloria toddi, Limenitis archippus; Speyeria idalia was missing.

Welling sent a most detailed and helpful summary of collecting in Lake County, species by species. One interesting fact in his report is a description of a small patch of rough, tall grass approximately 75 feet by 15 feet, in which two rare Hesperiids were found, Atrytone dion and A. conspicua. They were not found outside the borders of this patch anywhere. Welling's list of 50 species of butterflies and 134 species of moths from his area is on file in the Society's Field Season Summary files at Yale for those interested. Species seen in 1950 but not 1951 were Euptychia mitchelli, Eurema lisa, one melanic female of Papilio glaucus, rare in Ohio, Atalopedes campestris.

WEST VIRGINIA

Preston collected 25 species of Rhopalocera in Randolph, Tucker, and Preston Counties from July 7-11, when the most abundant species were Speyeria cybele, Boloria toddi, Polites verna.

KENTUCKY

Monroe and Merritt both observed fewer butterflies than in the previous three years, following a winter more severe than usual. No large migration of Danaus plexippus was observed. Both collectors searched for Lephelisca borealis again, but saw only one. The area where it has been found in Oldham County is being destroyed for collecting through construction. Monroe found four species new to the state at Mammoth Cave National Park: Erynnis martialis, Amblyscirtes hegon, Poanes hobomok, and Autochton cellus. He found Euphydryas phaeton common in marshes in Knox and Perry Counties. A trip to Black Mountain, elevation 4100 ft., yielded nothing not found elsewhere. In southwestern Kentucky in late September he found Euptoieta claudia very abundant, and several Feniseca tarquinius. Another state record, from Marshall County, was Erynnis zarucco. Merritt observed Incisalia henrici to be very common this year where it had previously seemed to be quite local. Melitaea nycteis was also more common than previously. He noted that the early spring butterflies were scarce. No Anthocharis genutia appeared this year. Also Papilio marcellus, Incisalia niphon, and Lycaenopsis argiolus were scarce. Erynnis of

various species (icelus, brizo, juvenalis, persius) were rare. One would see dozens where in previous years there were hundreds. Merritt reports finding Speyeria diana, S. cybele, and S. aphrodite flying together in Bell County, Ridge State Forest, altitude 2200 ft., on July 2. He also observed S. diana on Black Mt.

INDIANA

The only report from this state is from Leuschner. At Turkey Run he took Mitoura gryneus, Phyciodes tharos, Everes comyntas, and Papilio philenor. At Clifty Falls Park he noted a fresh male Speyeria cybele on June 7, a full month before they appear in Chicago. On June 15 he found Lycaeides melissa "common all over northern Indiana". He found hundreds of larvae of Hemileuca maia on the great willow meadows of Schererville, although over half of them were feeding on scrub poplar. Several fresh Lethe eurydice were seen. Another trip to Hesseville in early July turned up a fresh colony of Strymon titus and some female Speyeria cybele, also Lethe eurydice, Strymon edwardsii (common), S. acadica (scarce), but the many fine Hesperiidae which were found here at this time in 1949 were lacking. Leuschner also collected a great many moths in forest-collecting at lights, beginning at Turkey Run on May 18, when he found mostly Geometridae. Another trip there on June 4-8 found more Notodontidae as well as Geometridae. At Clifty Falls, about one-half mile off the Ohio River, lights were set up on the wooded banks of a deep chasm. The moths flew all night, from 8 to 5 a.m. About 500 specimens were taken each night, not including worn specimens of micros. The Notodontidae made up the greatest share of the catch. Again Geometers made up a good part of the catch, but there were also many fine Acronicta, of species quite different from those in Urbana, Ill. Among the larger moths Actias luna was commonest. Arctiidae were poorly represented. Clifty Falls was revisited Sept.8-11, when the Catocala season was in full swing. In contrast to normal Chicago collecting, C. amatrix and cara were definitely rare and poor, perhaps past their peak; C. vidua accounted for about 3/4 of all taken. Leuschner revisited Turkey Run on July 8-9 and found an entirely different fauna. Anisota stigma and Panapoda rufimargo were the most common moths, along with Sabulodes transversata and Abbottana clemataria.

ILLINOIS

CHICAGO AREA. Five collectors sent reports, two in great detail. Woodcock has completed three seasons of collecting moths at lights in his own backyard in Chicago, starting early in spring and ending late in the fall, checking every night. He is now able to list nearly 300 species of moths and micros taken at this one spot. A complete report has been prepared for later publication. Kistner, in a different section of Chicago, also collected moths at lights from May 1 to Sept.1, although some of his spots were in forests. He lists about 50 species of moths. An unusual capture was a specimen of Utetheisa bella taken in the middle of the Chicago Loop at light. He took Catocala minuta on July 11, the first record for the Chicago area. Kistner also collected the normal butterfly population of his area at River Grove in May and June and at Shiller Park in July. At the latter place he reports Asterocampa celtis, not reported by others. At Park Ridge on Sept.9 he took Lycaena helloides and one fresh male Melitaea nycteis, indicating a partial second brood of this species.

Hayes reports two broods of Apantesis vittata coming to lights, the first June 1-18, the second August 16-30, with the second more plentiful. He writes that Nymphalis antiopa was so common in late August that it got in the way of the collector. He observed Danaus plexippus very common in the city Sept.18-20 on their early fall migration. The last one was seen Nov.2.

Leuschner reports that an early highlight of the season was the capture of Euchloe olympia and Incisalia polios on May 12 near Waukegan, the latter "numerous almost beyond comprehension." At Urbana the moth collecting began with Palaeacrita vernata on Mar.3. Acronicta was well represented there in April and A. lobeliae was the most common species, where A. interrupta had been last year.

ALTON AREA. Lauck found 1951 a banner year for collecting. Due to the late, cold, and wet spring the early species were ten days later than usual. By the second week of June everything was flying on schedule. The excessive rainfall kept pastures and fields green and provided an abundance of Lepidoptera all summer and fall. At Marquette State Park near Grafton on April 21 he took Papilio glaucus, P. troilus, P. marcellus, Anthocharis genutia, Strymon melinus, Incisalia henrici, Thorybes bathyllus, Erynnis persius, E. martialis, Amblyscirtes vialis. Another trip to this spot on June 9 found Colias eurytheme swarming, with Pieris protodice and P. rapae. Lethe portlandia, Euptychia cymela, Cercyonis alope, Feniseca tarquinius, Strymon falacer were also present. In his garden a number of larvae of Agraulis vanillae and Euptoieta claudia were observed feeding on Passion Vine and several Sphingidae laid eggs on his Snow Ball bushes. During late July and early August many Papilio cresphontes were seen on the purple Iron Weed. Piasa Creek swarmed with Limenitis astyanax and L. archippus, as well as Nymphalis antiopa. Hundreds of Eurema lisa, Colias, and Nathalis iole were present around mud puddles. Phoebis sennae was strongly flying over the hills and Precis lavinia and Pyrgus communis were common on asters. The notable catch on Oct.14 was one Strymon m-album, a great rarity so far north.

MISSOURI

This co-ordinator found the same conditions as Lauck found at Alton, which is only 25 miles from St. Louis. Where I usually find Anthocharis genutia by April 10, this year I saw none until May 11. Trips to favorite spots in Jefferson County produced no Atrytonopsis hianna or Hesperia metea and only one Mitoura gryneus. Euchloe olympia was absent for the third straight year, and even Incisalia henrici was scarce. Practically no Erynnis brizo, juvenalis, or persius were seen. Then "the rains descended and the floods came." I left on June 28 for a six weeks trip to Alaska and barely got through Kansas on the way. In late August a trip through the Ozark Mts. of south-central Missouri produced very few Lepidoptera. A notable capture in Kirkwood on August 19

FIELD SEASON SUMMARY 5. CENTRAL - concl.

was a specimen of Lephelisca muticum. There must be at least two broods of this scarce insect here as I have taken it in June, Aug., and Sept. An interesting and unusual sight on Aug.19 in Kirkwood was a veritable flying circus of butterflies around a group of elm trees in a woodland pasture where several of the trees were exuding sap. There were several species involved, including various Polygonia, Asterocampa, Vanessa, Limenitis, and possibly others.

On June 8 in Linn County, C.L. and J.E. Remington found: Euptychia cymela, Lycaenopsis pseudargiolus, Speyeria cybele, and Ancyloxypha numitor abundant and fresh; Thorybes pylades, T. bathyllus and Polygonia interrogationis (both forms) numerous but rather worn; and one worn specimen of Danaus plexippus.

- -

Contributors: F. R. Arnhold; R. Beebe; M.L. Bristol; Mrs. Hazel Chase; H. K. Clench; L. W. Griewisch; J.B. Hayes; Mrs. Vonta P. Hynes; D.H. Kistner; T. Koerber; A. G. Lauck; R. Leuschner; J. R. Merritt; B. L. Monroe; M.C. Nielsen; F. W. Preston; C. L. and J. E. Remington; R. Romine; W.E. Sieker; J.L. Tveten; E.G. Voss; E. C. Welling; H. E. Woodcock.

6. SOUTHEAST - FLORIDA TO LOUISIANA, NORTH TO ARKANSAS AND MARYLAND

by Ralph L. Chermock
University, Alabama

The report on the southeastern section has insufficient data to draw any broad conclusions. The season was apparently somewhat variable, but the available information does not include summaries of climatic variations, or comparisons of the fauna with previous years, to provide a basis for analysis. However, the following information might be useful for comparison with previous or subsequent seasonal summaries.

Nicolay, collecting in the vicinity of Washington, D.C., from June 20 to the end of the year, made observations on butterflies there. Very few butterflies were on wing from June 20 to Aug.1, with many species scarcer than would normally be expected. However, the season improved later in the year. During the first two weeks of July, he collected near Norfolk, Va., where collecting was excellent. The following species were relatively common: Atrytone dukesi; Poanes viator; Amblyscirtes textor; A. carolina; Hylephila phyleus; Papilio glaucus; P. marcellus; Everes comyntas; Lycaenopsis argiolus; Strymon cecrops; Limenitis arthemis astyanax; Vanessa virginiensis; and Phyciodes tharos. Freshly emerged specimens of Atrytone dion, Lerema accius, and Ancyloxypha numitor were on wing at this time. During the last week of August he collected the same area again and found A. dukesi (believed to be second brood); A. dion; A. logan; A. ruricola; P. viator; P. yehl; P. zabulon; Polites verna; L. accius; Wallengrenia otho; A. textor; Atlides halesus; P. glaucus; and P. polyxenes.

Smith, collecting at Newnan, Georgia, submitted a list of dates for the first observed appearance of 42 species of Rhopalocera during 1951, including: Papilio polyxenes - Mar.25; P. troilus - Mar.26; P. marcellus - Mar.25 and May 19; P. philenor - Apr. 1; Eurema nicippe - Feb.24; E. lisa - June 1; E. daira - Aug.10; Phoebis eubule - Mar.25; Colias eurytheme - Feb.25; Zerene cesonia - Apr.1; Euptychia hermes - Apr.29; E. gemma - Mar.25; Cercyonis pegala carolina - July 6; Phyciodes tharos - Mar. 24; Melitaea gorgone - Apr.29; Vanessa virginiensis - Mar.22; Precis lavinia - Apr.10; Limenitis arthemis astyanax - Apr.28; Danaus plexippus - Apr.13; Strymon melinus - Mar.2; Incisalia irus - Apr.28; Feniseca tarquinius - Mar.26; Everes comyntas - Mar.23; Lycaenopsis argiolus - Mar.2; Epargyreus clarus - Apr.11; Thorybes pylades - Apr.29; T. bathyllus - Apr.1; Pyrgus communis - June 17; Pholisora hayhurstii - July 5; P. catullus - Apr.28; Erynnis martialis - Mar.31; Hesperia metea - Apr. 29; Problema byssus - June 15; and Atrytonopsis hianna - Apr.29.

Kimball, collecting in the vicinity of Sarasota, Florida, sends the following records of moths from that area: Nola lagunculariae; Afrida notatis*; Prodenia sunia*; Catabena esula; Xanthoptera aurifera*; Metaleura alibinea*; Tolype minta; Chlorochlamys paularia*; Microgonia cubana*; Heterocampa cubana; Lamprosema schistisemalis*; Syngamia titiusa*; Nacoleia hampsoni; Argyria diplomochlalis*; Palatka nymphaella; Aristotelia corallina*; Emprora argentilineella*. [Species marked with an asterisk appear to be new records for North America. - E.G.M.]

Davidson sends the following notes on collecting in central Florida: "The unusually cold winter of 1950-51 appeared to have a profound effect upon butterflies in Central Florida. Whereas many species were on wing during the two preceding winters, practically none was flying for nearly two months following the cold snap at Thanksgiving time in 1950. A few Precis lavinia, an occasional Phoebis sennae, Euptychia hermes, and Danaus plexippus were all that were seen. Heliconius charitonius did not show up before summer. April brought good flights of Papilio palamedes, P. marcellus, Eurema lisa; Zerene cesonia, Euptychia areolata, Phyciodes tharos; P. phaon, Strymon cecrops, Polites vibex, Wallengrenia otho, Atrytone arogos, and Atrytonopsis loamii. By September, it appeared that the leeway had been made up, and with a few exceptions populations were

strong. No individuals of Atlides halesus or Strymon m-album were seen, and among the skippers, subnormal numbers were noted in Lerodea eufala, Lerema accius, Panoquina ocala, and Erynnis spp. At salt water on Merritt Island, there was a scarcity of Ascia monuste and Panoquina panoquin, but a good late flight of Hemiargus ceraunus. The year proved to be a good one for Eurema nicippe and the Papilios. Pieris rapae swarmed about the cabbage fields near Sanford in May. In October, a strong concentration of the larvae of Papilio polyxenes was noted on the umbellifer Oxypolis filiformis. Erinnyis ello was relatively scarce, and a few larvae of Pholus fasciatus and the oak-feeding Datana were seen.

Epstein collected in southern Florida from Oct. 14-25, and sent the following notes. He found the following species common: Danaus gilippus; D. plexippus; Heliconius charitonius; Agraulis vanillae; Phyciodes phaon; Anartia jatrophae (local); Strymon cecrops; S. melinus; Papilio cresphontes; P. palamedes; P. polydamas (local); Phoebis sennae; P. agarithe; Eurema nicippe; Ascia monuste; Appias drusilla (local); Phocides batabano; Urbanus proteus; Pyrgus syrichtus; and Lerema accius. The following species were less abundant to rare: Dryas julia; Euptoieta claudia; Phyciodes frisia; Marpesia petreus; Anaea floridalis; Limenitis archippus; Papilio glaucus; Phoebis philea; Eurema lisa; E. daira; Strymon m-album; S. martialis; Polygonus lividus; and Copaeodes minima.

In central Alabama, 1951 produced the poorest collecting season in four years. This was probably partially due to an exceptionally cold winter, which extended far into the spring, and to a somewhat average late spring and early summer, followed by a three-month drought which extended into October. Winter came early, resulting in a short autumn. Butterflies which are normally characteristic of the early spring were relatively scarce or absent. However, the late spring fauna was somewhat better than average. Euphydryas phaeton, Melitaea gorgone, M. nycteis, and Megathymus yuccae were recorded for the first time from the Tuscaloosa area during this period. The extended drought resulted in a very poor summer season, with even the commonest butterflies being relatively scarce. During the fall, Eurema nicippe, E. lisa, Phoebis sennae, Euptychia hermes, Lethe portlandia, and Lerema accius had good flights. These were soon stopped by early cold spells, and very few butterflies were on wing during the winter months.

Freeman sent the following notes on collecting in Arkansas: "During the first of June, the following species were normal as to occurrence and were fairly common: Strymon melinus; S. falacer; Amblyscirtes vialis; A. linda; Polites themistocles; and P. manataaqua. The following were normal, which is usually rather scarce: Speyeria diana; S. cybele; Lethe portlandia; and Strymon ontario. The following appeared during early June; however the normal time is during July: Strymon liparops and Polites verna. During the period from July 19 to Aug.3, the following species of Rhopalocera were found in normal numbers, which is commonly: Thorybes pylades; T. confusis; T. bathyllus; Amblyscirtes vialis; A. belli; Achalarus lyciades; Epargyreus clarus; Lerodea l'herminieri; Erynnis martialis; E. horatius; Pholisora catullus; P. hayhurstii; Pyrgus communis; Atalopedes campestris; Polites manataaqua; P. verna; Strymon melinus; Euptychia gemma; E. hermes; E. cymela; Papilio philenor; P. polyxenes; P. troilus; P. glaucus; Phyciodes tharos; Precis lavinia; Vanessa atalanta; Limenitis arthemis astyanax; Nathalis iole; Eurema lisa; Colias eurytheme; and Zerene cesonia." Dolba hylaeus, Herse cingulata, Phlegethontius sextus and quinquemaculatus, Celerio lineata, Xylophanes tersa, and Hemaris thysbe and diffinis were common. A few specimens of Cressonia juglandis were collected around lights.

- -

Contributors: W. M. Davidson; H. Epstein; H. A. Freeman; C. P. Kimball; S. S. Nicolay; M. Eugene Smith.

7. NORTHEAST - DELAWARE AND PENNSYLVANIA NORTH TO SOUTHERN QUEBEC

by Sidney A. Hessel
Woodmere, N. Y.

Based on reports from 24 contributors evidence is not at hand to indicate any abrupt change in the Lepidoptera population as a whole. The reports seem to reflect local experiences as to human interferences and weather conditions. A general trend is, of course, apparent that the progressive reclamation of the land for agriculture, industry, and residence, the draining of the swamps, the broadcast use of chemicals in pest control, and the intentional and unintentional burning of waste areas are localizing many Lepidoptera populations in the area. Most dates of first capture, especially of early species, run one to two weeks ahead of 1950 but behind 1949 by perhaps comparable amounts.

Except for Danaus plexippus, migrants were scarce, though no more so than in 1950. There were a few records only of Vanessa cardui and none, except in the southern part of the area, of Phoebis sennae eubule. The Monarch, on the other hand, came early, stayed late, and flew in good numbers. Some very notable migrating concentrations were seen on the Conn. shore and on Long Island. Total numbers appeared to represent an increase well over the 1950 population, though by no means equal to maximum years. The earliest date observed as Apr.17 and the latest Nov.29, both Orient L.I. (Latham). Among the moths a few Sphingidae typical of more southern areas were taken, but they were scarce, as were Alabama argillacea and Anticarsia gemmatilis. Sunira bicolorago, as infrequent as the preceding two in 1949 and 1950, was in abundance.

FIELD SEASON SUMMARY 7. NORTHEAST - cont.

Reported from Conn. at greatly increased levels were Cingilia catenaria (adults at light and day-flying), Alsophila pometaria, and Alypia octomaculata (larvae, but not as bad as 1950).

Temperatures in the late fall of 1950 were generally above normal in the Northeastern area with greatest plus departures in the northern and northeastern U.S.A., southeastern Canada and the Maritime Provinces. Precipitation was also above normal, heaviest in western Pa., northern Me., and the Canadian area, except for northern N.S. There was a great storm in late November, a combination of heavy rain, storm tides, flash floods, and winds of whole gale to hurricane force. This occurred as a suddenly intensified disturbance from the southern Appalachian highlands moving north and northwest, the most violent storm of its kind on record. Although spared the unseasonal cold and snow to the westward by the inflow of warm moist marine air, New England had severe gale and flood damage. Two inches of rainfall were recorded over a large part of New England on the night of Nov.25-26, and four to six inches fell in some places in a three-day period. Winds were generally worse inland than at the sea-coast. New England recorded its second wettest and fourth warmest November in its sixty-three years of records.

December, January, and February continued the trend of the earlier season with temperatures 2-6 degrees above normal in northeast U.S. and from 5 degrees in southeast Canada to 8-10 degrees over Nova Scotia. Rain and snowfall were about normal except in western and southeastern N.Y., N.J., southeastern Pa., Md., and Del., where they were light, and along the coastal areas in Canada, where they were somewhat above normal.

Above mean temperatures continued throughout the spring, from plus 2 degrees (Md., Pa., Del.) to 4 degrees (coastal Me.) and 5 degrees (Maritime Provinces). Rainfall was near normal, somewhat lighter in east-central Pa., eastern Md. and Del., and above normal in N.B.

Summer temperatures were about normal, somewhat warmer in the Middle Atlantic states and N.E. coast and cooler in interior Pa. and New York state, Vt., N.H., and Que. Rainfall was spotty with average or plus amounts over most areas, slightly below normal in southern New England, the Middle Atlantic states, and most of the Canadian area except southern Que., and N.B., where it was above normal.

Fall temperatures were above normal throughout New England, northern N.Y., and in the coastal area from southeastern N.Y. to Del. and eastern Md.; a few degrees cooler than mean temperatures prevailed in the balance of N.Y., Pa., and western Md. Rainfall was normal to above normal in coastal Canada, New England, the eastern parts of N.Y., Pa., and Md., and in N.J. and Del.; below normal in the inland Canadian area and western N.Y., Pa., and Md.

The detailed summary by regions follows.

PENNSYLVANIA

NORTHEASTERN LANCASTER COUNTY (Ehle). 87 species of Rhopalocera representing a 12 year list are reported upon in tabular form for 1950. Unlike the winter-spring season of 1950, the corresponding period of 1951 was more nearly normal, with average or above average temperatures and precipitation. Possibly as a consequence, the majority of the emergence dates were one to two weeks earlier than those of 1950 and more in line with 1949. Anthocharis genutia was found a month earlier, Lycaenopsis argiolus two weeks earlier; Papilio cresphontes larvae had all dispersed when sought in the third week of May. The butterfly population has been quite constant for the past three seasons. Although Danaus plexippus was, as usual, abundant throughout the season, migrations were not observed. Other migratory species were scarce; a single Phoebis sennae was observed Sept.15. Lethe eurydice appeared as usual in early July, but unusually large numbers of worn specimens were still on the wing in Sept. Among species to be classed as scarcer than usual were Precis lavinia (as in the past two seasons); Vanessa virginiensis, V. cardui, Euptoieta claudia, and Papilio polyxenes (as in 1950). Those appearing more commonly included Nymphalis antiopa, Lycaenopsis argiolus, Strymon falacer, S. liparops, and S. edwardsii, the latter in the wake of greatly swollen numbers in 1950. Other highlights of the season were: Euphydryas phaeton, many mature larvae feeding on Chelone glabra (May 22); Papilio philenor ♀ observed ovipositing on small isolated plants of Aristolochia serpentaria (12 eggs were collected with all food plant which could be found in the area; the resulting larvae ultimately consumed at least ten times the quantity of food plant that would have been available at the original area); Aug.12 and 21 yielded the rare "yellow-black" female forms of P. glaucus.

IRWIN AREA (Ackermann). The winter was rather severe in western Pa. and the spring late. Only a few early Geometers had appeared by April 7. At that time a southern trip was begun, primarily to observe Papilio marcellus at various latitudes as spring advanced northwards. Quite frequently, Ackermann states, P. marcellus appears at the northernmost locality he knows by the middle of April. This is in Preston Co. near Morgantown, W. Va., at the Pa. border. (In the period 1913-20 P. marcellus was taken regularly each year in fair numbers at Mt. Gretna near Lebanon in late June and early July. S.A.H.). The first specimen was seen April 8 in S.C. The northeast district was not reentered until April 24 on which date the Pa. locality was visited without evidence of the species. All vegetation was very retarded. Some fresh Incisalia henrici were taken. In Elk Co. conditions were about the same as two weeks earlier in W.Va. Among more common moths at lights were Crocigrapha normani, Melalopha albosigma, Cladara atrolitura, and Operophtera bruceata. Bapta semiclarata was flying by day along a woods road. At Irwin Cirrophanus triangulifer was taken Sept.9. On a second trip southwards Atalopedes cam-

pestris was taken Sept.9-21 at Slaughter Beach, Del., and Eurema lisa at Salisbury, Md., Sept.9-22. At Cape Charles, Va., there was a "great swarm" of Precis lavinia coenia.

CENTER COUNTY (The Prestons). Records of 45 species of diurnals are presented in tabular form for the period Apr.19 - July 12. As the observers had no previous experience in the locality, no comparisons are made with other years. The season began about Apr.20 with the appearance of several Pieris rapae, a worn Nymphalis antiopa, and Lycaenopsis argiolus. The latter lasted until about May 1. Erynnis began to appear about Apr.27, E. brizo lasting until May 13, E. juvenalis remaining into July; the flight of E. icelus was May 13-30. Papilio glaucus was seen May 22 and became abundant June 1 in the mountains. Epargyreus clarus and Poanes hobomok were first captured May 22, the latter disappearing by mid-June and the former continuing all summer. Thorybes pylades and Hesperia sassacus were found May 26. The winter had been severe, and Aug. and Sept. were very dry. Although the type locality for Glaucopsyche lygdamus nittanyensis was visited in early June and again in the third week, none were found.

NEW JERSEY

GENERAL (Mueller). Diurnals were much scarcer than last year. Common, however, were Papilio glaucus, P. troilus, Danaus plexippus, Phyciodes tharos, Polygonia interrogationis, P. comma, Limenitis archippus, Boloria toddi, Vanessa atalanta. In fair numbers but not as common as last year were Pieris rapae, Colias eurytheme, C. philodice. Scarce were Papilio cresphontes, all Theclinae (especially Mitoura gryneus and hesseli), and all Hesperioidea except Panoquina panoquin which was common in the salt marshes. Moths were about as frequent as in the previous season but at light only. Bait produced almost nothing. Very common were Ampeloeca myron, Darapsa pholus, Phlegethontius sextus, Paonias myops, Antheraea polyphemus, Eacles imperialis, Anisota rubicunda, Catocala ilia, and C. ultronia. Other Catocalae were scarce, as in 1950. Unusual captures include Herse cingulata, Xylophanes tersa, Pachysphinx modesta, Merolonche dolli, Eutoype depilis (one each), all from the Lakehurst district.

LAKEHURST AREA (Ziegler, Rawson, Ehrlich, and Gillham). May 5, Incisalia polios, mostly fresh males, was not uncommon over Bearberry; I. augustinus was a bit worn, common, and apparently well past its peak; I. niphon, a few specimens in fresh condition. Search for Mitoura hesseli at this time produced only a glimpse of an occasional individual winging rapidly across the road and open areas. On May 12 3 collectors were able to take a total of 21 specimens. Matings were observed. In Lebanon State Forest June 23, a warm but cloudy day, Lycaena epixanthe was common in the cranberry bogs, and was taken in fair numbers. Strymon liparops was numerous. A few Atrytone bimacula were taken in the Forest marshes.

In the Springdale area, on July 7, Strymon falacer was common and fresh. Lephelisca borealis was in fair numbers but apparently scarcer than most years. Speyeria cybele and Strymon titus were fairly common. S. acadica was found about a patch of Salix discolor; S. edwardsii was scarce.

NEW YORK

SARDINIA AREA (Rupert). The most notable feature of the season was the reappearance of species which were regularly taken ten or fifteen years ago but which have been missing or rarely seen throughout the 1940's. Among these were Acronicta noctivaga, A. sperata, Phlogophora iris, Dipterygia scabriuscula, Lithophane oriunda, Orthodes furfurata, Anaplectoides prasina, and Euthyatira pudens (of those species that commonly come to bait); and Earophila vasiliata, Melalopha apicalis, Haploa confusa, and Ellida caniplaga (among those commonly attracted to light). Conspicuously absent were the usual Saturniidae. Considerable search for cocoons during the winter of 1950-51 failed to disclose even one Hyalophora cecropia, H. promethea, or Antheraea polyphemus, all of which are usually common. At light only Actias luna was present in normal numbers. The Catocala season, about two weeks late, was otherwise normal. The only new record for the area was Ulolonche modesta (1).

ITHACA (Keji). Comparison should be made with prior summaries. The number of different days on which each species was seen and the range of dates is presented together with keyed information as follows: "E", "L", and "S" represent earlier, later, and same, with regard to first and last observation dates respectively. The numerals measure such margins in days compared to 1950. "I" (increased), "D" (decreased), and "N" (no significant change) compares the number of individuals to 1950. Man-made changes in the areas forming the bases of previous reports have upset somewhat the strict continuity of records in this respect. Observations have been extended more to the wooded area. Weather permitting, records were made daily for about one-half hour at noon and from about 5:30 to 7:15 P.M. The winter was relatively cold, snow covering the ground for the most part on 85 of 118 days from Nov.28 to Mar. 25. Spring developed rather suddenly about mid-May. The season ended abruptly with cold and snow Nov.1. Rainfall was only moderate but the vegetation remained green. Papilio polyxenes May 14-Aug.27 (48 days: 10E, 37E, D); P. glaucus May 21-Aug.14 (35 days: 20E, 11L, N); P. troilus June 19-July 19 (4 days: 11E, 24E, D); Pieris rapae April 30-Oct.26 (147 days: 2E, 6E, I); Colias eurytheme June 16-Oct. 26(95 days: 8E, 12E, I); C. philodice May 15-Oct.26 (134 days: 9E,5E, I); Danaus plexippus July 10-Oct. 26(53 days: 34L, 5E, D)(as in 1950 definite indication of southerly flight in Sept. and Oct., observed almost daily Sept.15 to Oct.5, thereafter singles on Oct.18 and 26); Lethe portlandia June 28-Aug.2 (12 days, none 1950); Cercyonis alope July 4-Aug.13 (17 days: 5E, 13E); Euptychia cymela May 25-July 3 (31 days; 14E, 7L, I); Speyeria cybele June 24-Sept.4 (13 days: 6E, 5E, D); Boloria toddi May 27-Sept.19 (21 days: S, 5E, I); Euphydryas phaeton absent 1951; Melitaea nycteis,one, June 25, none 1950; Phyciodes tharos May 21-Oct.26(95 days: 4E, 5L, I); Polygonia interrogationis June 25-Sept.23(11 days: 1E, 21L, I); P. comma June 25-Sept.23 (11 days, none 1950); Nymphalis antiopa Apr.4-Oct.15 (10 days: 2E, 6E, I);

FIELD SEASON SUMMARY

Vanessa atalanta June 25-Sept.19 (33 days: 30L, 12L, I); Vanessa cardui absent; V. virginiensis, one, Sept.12, none 1950; Limenitis a. arthemis June 7 - Sept.9 (17 days: 6E, 18L, I); L. a. astyanax, one, Aug.13, none 1950; L. archippus June 9-Sept.8 (6 days); Strymon liparops June 20-July 21 (8 days,none 1950); S. titus July 6-19 (4 days, none 1950); S.falacer July 2-10 (6 days, none 1950); Lycaena thoe June 17-Aug.26 (4 days: 11L, 35E, D); L. phlaeas June 18-Oct.26 (18 days: 30E, 17L, D); Everes comyntas July2-Oct.1 (26 days: 21L, 18E, D); Lycaenopsis argiolus May 18-Aug.10 (20 days: 4E, 12E, I); Epargyreus clarus May 25-July 14 (11 days: I); Achalarus lyciades June 29-July 15 (2 days, none 1950); Thorybes pylades May 19-July 14 (28 days); Pyrgus communis July 21-Oct20 (14 days: 46L, 43L, D); Pholisora catullus May 31-Aug.20 (11 days: 4L, 8E, D); Erynnis icelus June 16 only, none 1950); Ancyloxypha numitor June 5-Oct.4 (60 days: 8E, 27L, I about 100%); Poanes hobomok May 22-July 19 (32 days, none 1950). A male and female Strymon liparops strigosa were reared from Prunus serotina (det. A.B.Klots), a new food-plant record.

KATONAH (Klots). Strymon m-album ♀ Sept. (Ruth Gortner), believed the first authentic N.Y. record.

SOUTHFIELDS (Klots). Crambus youngellus July 2 (A.B.K.) and July 5 (A.B.K. and Rindge), believed the first record of the species since the type series was taken in 1908 near Ottawa, Ont.

EASTERN SUFFOLK COUNTY (Latham). Temperature from Jan. to Sept. normal. Snowfall was light and frost out of ground early. Rainfall was normal to June 1 but late summer and early fall were dry. Most species were recorded on or before normal dates. Due to cold, rain, and wind most of the rarer late species of moths were not recorded at all. Alabama and Anticarsia were as scarce as in 1950, a year of more normal weather at this season, but Sunira, scarce as the other two last year, appeared in large numbers. Of diurnal migrants Danaus plexippus, fall flight 2/3 increase over 1950, 2/3 max. year; Apr.17 is 2nd earliest spring record; last appearance Nov. 29; Phoebis sennae no record for 17th consecutive year; Vanessa cardui, single Aug.29. Among species found more commonly than in 1950 were Vanessa virginiensis, Hesperia leonardus, Ceratomia amyntor, Automeris io, Diacrisia virginica (common after 4 yrs. scarcity), Acronicta rubricoma, A. americana, Ochropleura plecta, Lacinipolia renigera, Ulolonche modesta, Nephelodes emmedonia, Leucania pseudargyria, Pseudaletia unipuncta, Cucullia asteroides; Oncocnemis riparia, Procus modicus, Leuconycta diphteroides, Anorthodes tarda, Euthis anotia grata and unio, Autographa falcigera, Catocala ultronia, Euparthenos nubilis, Scolecocampa liburna, Plathypena scabra, Datana ministra, Melanolophia canadaria, Erannis tiliaria, Pero unusually common, Patalene dyzonaria, Prochoerodes transversata, Nomophila noctuella, Eucosma lathami (most common year), Prionoxystus robiniae, Trichotaphe iothalles. Those rarer than in 1950 include Celerio lineata, Hyalophora cecropia, Actias luna, and Eacles imperialis very scarce; Euxoa detersa, Agrotis vetusta, A. gladiaria, A. volubilis, A. ypsilon, Feltia subgothica, F. annexa, F. geniculata, Peridroma margaritosa, Graphiphora c-nigrum, Scotogramma trifolii, Polia grandis, Leucania multilinea, each in numbers only half of 1950; Ceramica picta; Apamea inordinata, Procus bridghami, none for 3rd year; Amphipyra pyramidoides rare for 12th year; Prodenia ornithogalli, Laphygma frugiperda, Autographa biloba, A. precationis, and Agrapha aerea; all Catocala except ultronia rare; Hemerocampa leucostigma, Tolype laricis, Biston cognataria, Cingilia catenaria, Parasa and Euclea, Lagoa crispata, Pyrausta nubilalis, Atteva aurea. Other items of interest were: Papilio philenor (Oct.31, first in 7 years and latest date); Speyeria idalia (holds own at Montauk, about 300 seen Aug.29, latest Oct.10); Limenitis arthemis "albofasciata" (Sept.14, first in 11 years); Cisthene subjecta (one taken for third successive year); Loxagrotis acclivis (six); Protoleucania rubripennis (Aug.4); Lemmeria digitalis (a first record Oct.21); Zale coracias (new record, May 22); Sudariophora acutalis (appeared after 3 yrs. absence); Ambia striatalis (first record, 12 seen, 6 taken in August).

7. NORTHEAST - cont.

SUFFOLK COUNTY (Wilcox). June 28 at Watermill a single Calpodes ethlius was captured. A number of collectors took the species in 1911 but it has apparently not been seen here since. A big flight of Hemileuca maia was found again this year at Westhampton; first observed Oct.12, none were to be seen by Nov.1. The peak of the flight was Oct.17 when 61 were counted in 20 minutes (11 A.M.). On the same date last year the average was 54 per hour and at the peak on Oct.19 attained 120. (I believe the ratio of ♂♂ to ♀♀ was at least 50:1, nor were any ♀♀ to be found among those resting on the foliage when clouds obscured the sun. S.A.H.). An 8-mile strip of beach from Quogue to Shinnecock inlet was checked for Danaus plexippus on Sept.30 by driving along the dune road at 10 m.p.h. Between 3 and 3:30 P.M. 412 were counted, most of which were flying west. (This would be progressing southwards by following the coastline. S.A.H.). On Oct.3 the same stretch showed only 21 individuals and Oct.14 only 2. On Oct.3 one Monarch was paced along the road by car, being recorded as progressing one mile in 5 minutes without stopping, favored by an east wind of about 20 m.p.h. Another individual was observed for an hour on the same day, at the end of which time it had moved only 100 feet and that to the east against the wind. It had been feeding continually (11 to 12 noon) on the seaside goldenrod although others were passing westward. The following Crambus were taken: vulgivagellus, agitatellus, laqueatellus, leachellus, bidens, hortuellus topiarius, and albellus. Also captured were Eucosma robinsonana, E. adamantana, and Proteoteras naracana.

CONNECTICUT

NEW HAVEN AREA (Remingtons, Bellinger). The winter of 1950-51 once again was not severe. The mean minimum temperature for Dec., Jan., Feb. was 23° F., and on only three days did the temperature reach 0° or lower (lowest -5° on Dec.27). The mean maximum for the same period was 39° F., the temperature exceeding 50° on 12 days (highest 59° on Dec.4 and Feb.27). There was some snow on the ground con-

tinuously from Dec.16 to Jan.16, and a total of 66 days, with the last snowfall on Mar.22. However, the snowfall was not heavy, the total precipitation between the first (Dec.16) and last snowfalls being 15.5 inches. The steady killing frosts ended Mar.28 with only two later (Apr.1 and 17). Spring precipitation was rather low, the totals as follows: April - 3.4 inches; May - 4.4 inches; June 1-15 - 1.3 inches. However, the spring was very cloudy, with only 29 sunny days from April 1 to June 15, and some rain fell on 51 days during the same period. May was unusually warm, the extremes of temperature 87° and 33° F., with the means at 70° and 44° F. Such records for the summer are not yet available, but the weather seemed average. The fall was shortened by cold periods.

Spring collecting dates for key butterflies, with 1950 comparisons, follow:

	1951	1950
L. pseudargiolus	13 Apr.-17 May	19 Apr.-14 May
E. brizo	21 Apr.-13 May	6 May-13 May
E. juvenalis	28 Apr.-31 May	13 May-4 June
A. genutia	28 Apr.- 9 May	3 May-13 May
S. melinus	6 May -	6 May-
L. hypophlaeas(gen.I)	15 May-26 May (fresh)	27 May- 23 June

These figures suggest that spring flight periods in 1951 were about a week earlier than in 1950 and,a comparison with 1949 figures shows, a week later than in 1949. In each year visits were made regularly about once a week to the same localities. Mitoura gryneus was virtually absent in 1951 as in 1950, in contrast to the year of spring abundance, 1949. A. genutia seemed to show some increase over the low level in 1950. With the summer species also, such as P. glaucus, P. troilus, E. cymela, S. falacer, P. hobomok, P. catullus, and A. numitor, the 1951 flight periods were several days earlier than in 1950 but considerably later than in 1949.

No northward movement of Danaus plexippus was seen this year. The breeding population was large in late summer and adults were numerous until Sept. 16. No distinct fall migration was seen here, but M.P. Zappe reported very large numbers flying along a narrow sand spit on the northeastern shore of the State, in company with large dragonflies (Anax junius?). Not one Vanessa cardui has been seen since 1949. No other definite migrations were recognized although a lone Papilio marcellus was seen here July 14 and probably had flown in from the south.

Species found much increased over 1949 and 1950 included: Asterocampa celtis (num. worn by 14 July; adults very num. 18 Aug.-8 Sept., the 1st second brood seen here in 3 yrs.); Speyeria idalia; Isturgia truncataria; Poanes zabulon; Hesperia sassacus; Alypia octomaculata; Nymphalis antiopa; Oreta rosea (Aug. larvae); Cerura (modesta?) - num. larvae; Limenitis astyanax (Aug.); Schizura unicornis (larvae); Rhodophora florida (esp. larvae); Hydria undulata (larvae a real plague!); Cingilia catenaria (incredible numbers at light and day-flying last half of Sept.); Alsophila pometaria (countless thousands 29 Nov.-4 Dec.); Alypia octomaculata (again some defoliating, but less than 1950); Phragmatobia fuliginosa (New Preston, very num.).

Species much scarcer than in 1949 and 1950 included: Euphydryas phaeton; Thorybes spp.; Strymon falacer; Lycomorpha pholus; Anisota senatoria (heavily parasitized); Feniseca tarquinius (absent where common in 1950); Datana drexelii.

Representative species present in rather "usual" numbers included: L. pseudargiolus; L. hypophleas; E. brizo and juvenalis; P. tharos; P. glaucus and troilus; P. hobomok; E. cymela; S. edwardsii (num.), titus (num.), acadica (few); Cercyonis alope; A. conspicua (very num.); P. hobomok; P. massasoit (num.); Lethe eurydice (num.); Strymon melinus (num.); Erannis tiliaria (Oct.23 to Nov.8); Datana integerrima (defoliating widely); Cisseps fulvicollis (num.); Pyrausta (futilalis?) - many nests on Apocynum.

New or unusual records were: Papilio marcellus (one, 14 July); Atrytone dion (new State record, Lakeville, 21 and 31 July); Chlaenogramma jasminearum (New Preston, 31 July); Hyalophora angulifera (New Preston, 31 July); Papilio philenor (18 Aug.); Melittia cucurbitae (17 July); Erynnis lucilius (6 May); Cryptocala acadiensis (new State record, New Preston, 31 July); Papilio cresphontes (large larva 14 Sept.).

GREENWICH (Klots). Noteworthy records: Strymon m-album 2 ♂♂, 3 ♀♀ April 28-May 4.

PUTNAM (Klots). Incisalia henrici May 13 and Limenitis arthemis arthemis x astyanax extreme form "albofasciata" ♀ Aug.25. In unusually increased numbers were Hesperia metea May 13, Polites peckius Aug., Polygonia comma Aug.26 - Sept.8. Crambus watsonellus Aug.30-Sept.8 are first Conn. records.

NEW PRESTON (Hessel). Collecting at light June 30 and July 31 produced a surprising number of fine species, most represented by one specimen. The following were apparently previously unrecorded for the State. Autographa ampla (2), Cryptocala acadiensis, Polia imbrifera, and Habrosyne gloriosa.

MASSACHUSETTS

BARNSTABLE (Kimball). Lycaena phlaeas and Polites peckius were abundant in early June. Response to light was good but to bait poor until early Nov., when it became good. Very few strays were recorded: Erinnyis ello July 15; Herse cingulata Oct.30; Anticarsia gemmatilis (3 only); and Cataclysta plusialis (slossonalis). Among the rarer species captured were Ampeloeca versicolor 8; Citheronia sepulchralis 6; Estigmene prima 1; Acronicta lanceolaria 1; Euxoa violaris 1; Hemipachnobia monochromatea 1; Lepipolys perscripta 1; Chaetaglaea cerata 4; Xylomoia chagnoni 1; Spartiniphaga includens 1; Atethmia rectifascia 4; Eutelia pulcherrima 2; Comachara cadburyi 3; Syngrapha altera 1; Chrysanympha formosa 5; Catocala herodias 1; Mocis texana 5; Panopoda carneicosta 1; Salia interpuncta 1; Hyparpax aurora 1; Schizura apicalis 3; and Stilpnotia salicis 1.

FALL RIVER AREA (Rogers). 1949-50 was characterized by a dry spring and a hot and dry summer with a scarcity of diurnals. An average fall of snow and

FIELD SEASON SUMMARY 7. NORTHEAST - cont.

moisture during the winter months of 1950-51 improved butterfly prospects. On Apr.27 Incisalia henrici appeared, followed on the 30th by I. augustinus and on May 2 by I. niphon and I. irus. At Waquoit Bay I. polios was in fair numbers on the Bearberry. All of these were early to normal in appearance and I. irus was still emerging on May 25 in above-normal numbers, the last few (worn) seen June 12. Flying simultaneously were Erynnis brizo, E. horatius, and E. juvenalis in usual abundance. These were followed in a week to two by E. persius, E. lucilius, and an occasional E. baptisiae. Strymon melinus and Mitoura gryneus appeared in normal abundance in the first week of May. On Apr.30 a single Danaus plexippus was observed flying vigorously in a N.E. direction, the earliest record of 30 years' observation. Limenitis archippus (May 25, early) was in company with Atrytonopsis hianna and Pholisora catullus. A fortnight later both sexes of L. arthemis astyanax were appearing in larger numbers than in 1949 and 1950. In early July Strymon titus, falacer, edwardsii, and liparops strigosus were in normal abundance. A striking male specimen with characters of S. l. liparops was captured July 9 near New Bedford. As in 1950, the past season found Speyeria almost entirely lacking. One pair of S. cybele was captured, nothing else even observed. 15 years ago at the Elizabeth Islands off Woods Hole it was a relatively simple matter to take a hundred S. idalia on a hot, sunny July day.

NEW HAMPSHIRE

WHITE MOUNTAINS (Ferguson, Lennox, Remington, Rawson, Hessel). Gasoline lanterns used in the spruce forest zone just below timber line on Mt. Washington in late July brought interesting results. Five species of Anomogyna were taken in decreasing frequency as follows: homogena, perquiritata, speciosa, atrata and imperita. Jefferson Notch (about 3000') yielded only the first three. During the last days of July two Boloria montina were encountered on the mountain and a surprising number of worn Oeneis semidea were still on the wing. All along the road Nymphalis j-album occurred in numbers as far as the Half-way House, and one was seen in the Alpine Gardens. Sugaring in the area had proved a failure. On a trip up the mountain Aug.11, a fine day for collecting, B. montina, Carsia paludata, Autographa u-aureum were numerous. Colias interior, Polygonia faunus, Nymphalis milberti, N. j-album, and even Oeneis semidea were represented by a few individuals. An Erora laeta ♂ was taken just above timberline, most unexpectedly. At Jefferson Melitaea harrisii larvae were numerous and Arctia caja abundant at light. Vanessa atalanta larvae were common, but Limenitis arthemis fewer than 1950. A Crambus whitmerellus (det. A.B. Klots), Aug.9, at light is the first New England record; it was known from Quebec and the Rocky Mts.

VERMONT

BENNINGTON COUNTY (Klots). A normal year for most butterflies. Unusually abundant were Pieris napi May 19-June 4, Erora laeta May 19-June 21, Limenitis a. arthemis and hybrids arthemis x astyanax June 20-21. Boloria toddi May 18-26 was unusually uncommon. Noteworthy record: Pieris virginiensis May 19.

MAINE

LINCOLN AND KATAHDIN AREA (Grey, Gillham, Klots). Vanessids were about as usual, all a bit scarce, Melitaea harrisii perhaps commoner in spots, but Euphydryas phaeton colonies becoming scarcer. Incisalia lanoraieensis was plentiful at Dead Stream Bog before the heavy rains. A Strymon acadica colony at So. Lincoln was fruitful last year, but produced none this year. Oeneis polixenes katahdin was a bit more plentiful than usual but O. jutta is yearly becoming scarcer. This year heavy rains inundated the bogs with disastrous effect on collecting. Skippers were about as usual, as were Speyeria; Danaus plexippus was not seen at all. Sphingidae were in somewhat greater numbers, with two Cressonia juglandis representing unusual captures. Parasemia parthenos, extremely rare, was back this year, and Euparthenos nubilis, not seen years ago, seems here to stay. Lycaena dorcas claytoni was uncommon to scarce at Springfield, where abundant in former years Aug.-10.

AUGUSTA, except as noted (Brower). The 1951 season was generally cold with little sunshine and poor collecting. The winter was rather mild, and warm weather produced the first moths at early dates. May through Aug. was cool, and June, July, and Aug. were also cloudy and wet. From then to the middle of Nov. was near normal, the latter part of that month cold and snowy. Lepidoptera were generally much below normal numbers. Light traps made good catches on few nights. Papilio polyxenes was first seen May 19; P. glaucus May 25; Colias eurytheme Aug. 5, scarce in Aug. and Sept.; C. philodice May 16, at Jonesboro June 1; Pieris protodice Sept.16, on wild mustard (new State record); P. rapae May 13; Danaus plexippus flew in unusually large numbers during the summer and fall; Euptychia cymela June 9; Lethe eurydice July 7; Cercyonis alope was present in fair numbers, a few as late as Sept.11; Oeneis jutta June 1 (Jonesport), June 3 (Whiting and Harrington); Speyeria cybele July 5 to Sept.16 (relatively many in mid-Sept. on thistles); S. aphrodite Sept. (small numbers); S. atlantis July 21 (Pittsfield, not found in Augusta area); Boloria toddi May 19; Euphydryas phaeton July 7 (none at hitherto best locality); Melitaea harrisii June 24 (Passadumkeag), July 7 (Augusta); Phyciodes tharos May 23 (Plymouth); Polygonia interrogationis July 13 (Oquossoc); P. faunus July 14 (all Polygonia very scarce); Nymphalis j-album not seen on wing though three found hibernating Nov. (Amherst); N. antiopa May 14 (1951 emergence), July 21 (Pittsfield); Vanessa atalanta May 30 (Lubec), none of 1951 brood; Limenitis arthemis June 24 (Lincoln), Sept.11 (Wiscasset) second brood!, scarce (Augusta); L. archippus June 10 (Palmyra) to Sept.16, scarce; Strymon melinus June 1 (Jonesport); S. acadica July 21 (Pittsfield); Incisalia augustinus May 26, June 1 (Jonesboro, common); I. henrici May 26; Lycaena thoe, July 7, (Windsor), Sept.16; L. phlaeas June 17 (Liberty), small numbers until Sept.; Lycaenopsis argiolus May 5 (Albany), May 26, (Augusta) common; Everes comyntas, scarce in late summer; Thorybes pylades June 17 (Liberty); Erynnis icelus May 31 (Dennysville); Carter-

ocephalus palaemon June 24 (Passadumkeag); Ancyloxypha numitor June 23, few in Aug.; Hesperia sassacus June 10 (Corinna), scarce; Polites themistocles June 24 (Passadumkeag); P. peckius, same; Poanes hobomok May 31 (Dennysville); Atrytone bimacula June 24 (Passadumkeag), others early July (Augusta); Amblyscirtes vialis June 1 (Jonesboro), June 10 (Corinna), none Augusta; A. hegon June 1 (Jonesboro). Of the many moth records submitted by Dr. Brower the following have been selected; the others are preserved for reference in the file at Yale: Sphinx canadensis July 6 (Moosehead); Hemileuca lucina Sept.16, in fair numbers near Augusta; Spaelotis clandestina Sept.22; Isturgia truncataria common at Augusta May 26; Apaecasia detersata May 14 (Southport), many at Jonesboro June 1; Metarranthis obfirmaria, abundant at Augusta May 26; M. broweri June 10 (Corinna); M. warneri June 10 (Bar Harbor).

NOVA SCOTIA

(Ferguson). The season again seemed an average one generally. Diurnals began perhaps a day or two ahead of schedule with the appearance of Incisalia and Lycaenopsis in full flight on May 2. Brephos infans was reported as early as April 4, and a fine series was taken near Halifax April 14, a little past their best. Nothing extraordinary was noted about the butterflies in 1951. Vanessa cardui failed to appear, and has not been seen since the big flight of 1949. A few Danaus plexippus were observed and also in late summer the presence of Colias eurytheme was noted, it having been absent in 1950. The only known colony of Glaucopsyche lygdamus couperi in N.S., discovered in Point Pleasant Park, Halifax, in 1950, continued to flourish. Like race mildredae of Cape Breton Is., this colony is feeding on Lathyrus rather than Vicia, the usual host of couperi. An extremely localized colony of Melitaea nycteis at S. Milford, Annapolis Co., was finally relocated June 27, having been originally discovered there by Dr. McDunnough in 1934. Single Strymon melinus and Hemaris gracilis were taken at the same time, both being very rare here. The season for diurnals was of normal duration, late Colias persisting into November.

The moth collecting was decidedly split into good and bad periods. Until the end of July collecting at light was very productive but, in contrast to 1950, late summer collecting was scarcely worth the effort. Weather during both seasons, considered as a factor, does not seem to explain the situation. The only good sugaring of the season was at Caledonia, Queens Co., May 16. One of the most striking comebacks of the season was Parasemia parthenos which, during late June and July, occurred commonly in almost every locality visited. It has been decidedly rare, though always present, for about 10 years. In 1950 similar abundance of the species was noted in N.B., though not N.S.

New records for N.S. include the following: Apantesis celia, Aldershot, May 18 (bred from larva); Crambidia casta, Aylesford, Sept.2; Euxoa albipennis, Auburn, Sept.1; Autricopis nexilis, near Halifax, May 20; Polia cristifera, Mt. Uniacke and near Halifax, June 20 - July 2 (4); Autographa ou, Cole Harbour, July 14; Zale cingulifera, Caledonia, Queens Co., May 16; Bombycia algens, Aylesford, Sept.2 (many); Zanclognatha pedipilalis, Cole Harbour, July 23; Sterrha rotundopennata, various localities in Nova Scotia, June 19-July 3 (many). On a bog near Halifax good series were taken of Anarta cordigera (June 7-9) and Syngrapha microgamma montana, (June 13-July 12). Only single specimens of each had been taken previously.

NEW BRUNSWICK

(Ferguson). During the first week of August a brief visit was made into northern N.B. in company with Dr. Klots and Mr. Grey. We found the Bathurst colonies of Coenonympha tullia nipisiquit and Lycaena dorcas dospassosi flourishing, and lengthy series were taken (Aug.4-6). South of Bathurst, on the road through Allardville and Bartibog, Polygonia gracilis, progne, faunus, and satyrus were all present, gracilis being the commonest (Aug.7). Boloria titania was also found, though not as commonly as in 1949, and a number of rather worn Strymon liparops and fresh S. acadica were noted. B. titania was again taken in fair numbers near Dorchester. B. toddi was taken at Covered Bridge, near Fredericton, Aug.4 (Klots), believed first positive N.B. record. Excessively cold nights in N.B. made moth collecting futile.

QUEBEC

BAIE D'URFE, MONTREAL REGION (Gray). June, July, and Aug. temperatures were a little below normal, with markedly low daytime temperature, unusually frequent light rain, and with unusually little sunshine in June and Aug. Some records of species follow: Pieris rapae and Nymphalis antiopa, April 27; Lycaenopsis argiolus, May 1; Papilio polyxenes, Xanthorrhoe emendata, May 22; Pieris napi, May 24; Papilio glaucus, May 26; Colias philodice, Scotogramma trifolii, Autographa falcifera, June 1; Phyciodes tharos, Procus mactatus, Autographa precationis, Palthis angulalis, June 5; Limenitis archippus, Unca carneola, Chytolita morbidalis, Olethreutes constellatana, June 12; Leuconycta diphtheroides, Polites themistocles, June 13; Danaus plexippus, Hypsopygia costalis, Perispasta caeculalis, Desmia funeralis, Loxostege chortalis, Menopsimus caducus, Exartema fasciatanum, June 18; Lethe eurydice, Boloria toddi, Lycaenopsis argiolus, Atrytone ruricola, Nymphalis antiopa, Speyeria cybele, S. atlantis, July 18; Haploa confusa, Calcaria bilineata, Menopsimus fractilinea, Epinotia similana, July 19; Colias eurytheme, Catocala cerogama, Pyrausta fumalis, Cisseps fulvicollis, Mesoleuca rufocillata, Dyspteris abortivaria, Oidaematophorus monodactylus, Aug.9; Acentropus niveus, Aug.25; Papaipema marginidens, Scoparia basalis, A. niveus, Aug.30; Graptolitha laticinerea, Papaipema inquaesita Oct.1; Erannis tiliaria, Oct.8, numerous on Oct.21; Colias philodice was still flying on Oct. 22; Acleris sp. was taken on Oct.30. Many other records from Dr. Gray are on file.

LAC MONDOR, NEAR ST. FLORE, ST. MAURICE COUNTY (Munroe). After a moderately cold winter with rather light snow cover, spring weather began at the normal time. The first Lepidoptera appeared in April. At the end of the month, when collecting was begun, the usual hibernating species, vanessids and

FIELD SEASON SUMMARY 7. NORTHEAST - cont.

various Cuculliinae, were present, but in small numbers. May was warm and sunny, and collecting was excellent. June, July, and Aug. were all exceptionally cool and wet, with the proportionate number of Lepidoptera declining gradually until they were well below the expected values by the beginning of Aug. Collecting was very poor throughout Aug. but comparatively good weather in Sept. was accompanied by good emergences of some autumnal species. Larvae were very abundant throughout the early part of the summer, but were less evident after July. In general, groups characteristic of open country occurred in very small numbers as compared with those associated with forests. Such forms as Crymodes devastator, Apamea arctica, the Leucania group, and most spp. of Crambus were exceptionally scarce; Euxoa spp. were scarce, but occurred in larger numbers than in 1945 and 1946. Migrant Lepidoptera were in general scarce; only one individual of Danaus plexippus was seen, in late Sept., flying south. Vanessa cardui and virginiensis were not seen; V. atalanta was rare. Three Magusa orbifera were taken at light in Aug., when Laphygma frugiperda was present in some numbers, but worn.

The most numerous species was Malacosoma disstria, which flew from early July to the end of Aug. During this period an estimated 40,000 individuals were attracted to the two lights in operation. On many nights the numbers were so great as to interfere with normal collecting, the moths congregating in clusters on the sheet and covering the bottom of the light trap. M. americana was about one-twentieth as numerous. After M. disstria in abundance was Choristoneura fumiferana with between 5000 and 10,000 individuals observed, followed by Sparganothis pettitana (the basswood-feeding form, the maple-feeding form being much scarcer), and Archips cerasivorana which defoliated many choke-cherry trees.

The first Lepidoptera taken were Feralia jocosa and Eupithecia sp. on the day of arrival, April 29; on May 1, 44 specimens were taken, including such species as Orthosia revicta, Cerastis tenebrifera, Metalepsis salicarum, Xylomyges dolosa, Homoglaea hircina, Pigalia titea, Bapta glomeraria, Eupithecia ravocostaliata, Semioscopis spp., and some worn hibernating Cuculliinae. Adela purpurea was seen on this date, but did not become abundant until later in the month. A similar assemblage of species persisted until about the third week of May. The most numerous species during this period were Xylomyges dolosa, Orthosia spp. (especially revicta), Nyctobia limitaria, Lozogramma subaequaria and Bapta glomeraria. Some other interesting or significant species were: Zale minerea (first appeared May 6, fairly common); Z. unilineata; Epirrhanthis substriataria (May 6-15, many); Cladara atroliturata (fairly common); Aethalura anticaria (May 7, abundant later); Euthyatira pudens (May 7 and later, few); Ectropis crepuscularia (becoming numerous); Abbottana clemataria (common); Melanolophia signataria and canadaria (common); Gluphisia avimacula (May 11, abundant by May 25, over 100 taken); Morrisonia spp.; Palpita arsaltealis, spring generation, not previously known north of Penna. (May 15); Ellida caniplaga (May 15 and later, becoming numerous).

The second period began about May 21 and extended to about the end of June, with some species that first appeared in early May carrying over into the earlier part of the second period. This was a period of increasing abundance of Lepidoptera. Notodontidae were remarkably well represented and some, such as Heterocampa, Schizura, and Melalopha spp., Notodonta basitriens, and Nadata gibbosa, very numerous; Gluphisia septentrionis replaced G. avimacula after about June 1. Some species taken in numbers in this period were: Anisota rubicunda (numerous, all form alba); Estigmene congrua (very abundant); Smerinthus cerisyi and jamaicensis; Pachysphinx modesta; Polia latex (several melanic); Tortricidia testacea; Crambus luteolellus; Melanolophia spp.; Unca spp.; Nymphula maculalis, allionealis, and badiusalis. Among many interesting captures were: Feralia comstocki (4 in late May); Tacparia zalissaria (4); Unca concinnimacula (fairly common in June); Sphinx canadensis (1 in June); Estigmene prima (1 in June); Baileya doubledayi (1 or 2); Panthea acronyctoides, June 16; Leucania inermis, several.

July brought in not only the pest species such as M. disstria, S. pettitana, C. fumiferana, and Archips cerasivorana, but a general increase of microlepidoptera, which became very numerous, while macros declined somewhat. Unusually numerous for the region were Scoparia, of several species but notably S. cinereomedia, and Crambus elegans. In the macrolepidoptera Enargia spp. and Zenobia pleonectusa were unusually abundant, as were Sicya macularia and Hesperumia sulphuraria. These species persisted well into Aug., and Enargia into Sept. Some interesting captures were: Cataclysta magnificalis, July 22; Oneida lunulalis, several in July; Eubaphe laeta, many; Cryptocala acadiensis, several; Argyria auratella, July 8; Lexis bicolor, several; Phlyctaenia (n.sp.); Pseudeva purpurigera; Lygris propulsata; L. testata; Loxostegopsis merrickalis; Lygropia rivulalis, July 15; Argyria critica, July 31; Udea itysalis, July 18; Pyrausta nicalis, July 18; Panopoda rufimargo, July 10. A massive flight of Acentropus niveus took place on July 31; the moths were struggling on the ground under the lights in large numbers, and one or two hundred specimens were picked up. Sthenopis quadriguttatus, Acossus centerensis, Oreta rosea, Ctenucha virginica, Apantesis spp., Leucania pseudargyria, Apamea arctica, Crymodes devastator, and many other species were scarcer than expected. The smaller quadrifid Phalaenids were numerous and varied.

August did not bring as marked a change in fauna as expected. Catocala were unusually late, C. praeclara being taken July 25, followed by C. sordida on July 31 and C. ilia on Aug.1. The commonest were: C. unijuga, semirelicta, relicta, and cerogama. C. briseis and concumbens were unexpectedly scarce. Towards the end of the month, second broods of a number of moths appeared, among them several species of Nymphula, and Crambidia pallida and casta. In general, collecting in Aug. was disappointing.

September was frost-free, and many summer species persisted nearly to the end of the month, among them Catocala spp., especially relicta. Autumn species mostly emerged about on time. Cingilia catenaria was unusually numerous; Tolype velleda was common, but late. Many other species were taken before the

end of the month. Unusual captures were: Eosphoropteryx thyatiroides, Sept.3; Hymenia perspectalis, Sept.22; and Lemmeria digitalis, Sept.21.

Butterflies were not collected very seriously. Pieris napi was rather common in May, and Lycaenopsis argiolus was phenomenally abundant. Pieris rapae was rather numerous, appearing after napi; Glaucopsyche lygdamus was a little below normal numbers, and appeared about June 1. A single Oeneis jutta was taken, five miles away from the nearest bog. Coenonympha tullia and Euptychia cymela were common in June; Papilio glaucus was rather scarce, P. polyxenes was not seen. Limenitis and Speyeria spp. were well below normal numbers. Among skippers Poanes hobomok was the most common. Melitaea harrisii and Euphydryas phaeton were common. Ancyloxypha numitor was present in small numbers, one being taken as late as Sept.22. Colias were common, though below normal numbers; C. eurytheme appeared later in the fall and in smaller numbers than C. philodice.

Contributors (those reporting directly only): O. Ackermann; P.F.Bellinger; A.E.Brower; G.Ehle; P.R.Ehrlich; D.C.Ferguson; N.Gillham; P.H.H.Gray; L.P.Grey; J.A.Keji; C.P.Kimball; A.B.Klots; R.Latham; J.Mueller; E.G.Munroe; E. and J.Preston; G.W.Rawson; C. and J.Remington; W.P. Rogers; L.R.Rupert; L.Wilcox; J.B. Ziegler.

8. FAR NORTH - ALASKA TO LABRADOR

by T.N. Freeman
Ottawa, Ontario

Eleven field parties were established by the Northern Insect Survey for 1951. These parties were stationed at the following localities:

ALASKA	Seward	NORTHWEST TERRITORIES
	Big Delta	Coppermine
	Nome	Bathurst Inlet
	Ft. Richardson	Hay River
		Spence Bay
YUKON	Rampart House	Alert
NEWFOUNDLAND	St. Anthony	

The Alaskan investigations were conducted at the request of the officers of the Anchorage laboratory of the United States Public Health Service, and the office of the Surgeon General, United States National Defense, Washington, D.C. The splendid assistance of the officers of those organizations is gratefully acknowledged.

The Division of Botany and Plant Pathology, Canadian Department of Agriculture, co-operated with the parties at Seward, Big Delta, Coppermine, and St. Anthony.

The Lepidoptera contained in the collections of the field parties are no indication of the seasonal abundance at the various localities. A good collection of butterflies from one area may actually represent a poor season and it might be possible to assemble a much larger collection the following year. The collections of insects from northern localities are often strongly flavored by the interests of the collector. The Lepidoptera contained in the collection of a coleopterist, for example, is often no indication of lepidopterous abundance. Therefore, no attempt has been made to summarize the lepidopterous abundance at the various survey stations. Instead, a short discussion of the type of fauna at each locality will be given.

The Lepidoptera collected at Nome consisted of about equal numbers of boreal and arctic insects. The remainder of the Alaskan collections were essentially boreal and northern transition*, with a few arctic species taken at altitudes near or above the tree-line.

Rampart House is situated at the Alaska-Yukon border on the Porcupine River. The insects are essentially boreal with a few northern transition and arctic species. With the exception of Hay River, which lies well within the boreal region on the south shore of Great Slave Lake, all the remaining localities in the Northwest Territories possess an arctic fauna. At Bathurst Inlet several boreal species were captured; however, the food plants of those species apparently do not occur in the Arctic region, and it would appear that certain meteorological conditions exist and transported those species many miles north of their normal habitat. Coppermine and Bathurst Inlet are on the arctic coast of the continental land mass south of Victoria Island. Spence Bay is at the neck of the Boothia Peninsula, near the type locality of the Curtis species described from specimens taken by the Ross Expedition in 1829-33. Alert is on the northernmost point of land in Canada, at the northern tip of Ellesmere Island.

At Alert, Bruggemann took only 3 species of Lepidoptera: Boloria polaris, the liparid Byrdia groenlandica, and the geometer Psychophora sabini. [All 3 were also taken there in 1950 by J.P. Johnson, Jr. - C.L.R.]. St. Anthony is near the northern tip of Newfoundland. The Lepidoptera consist of boreal species with a few northern transition and arctic intrusions.

I hope that these notes, while not dealing with seasonal abundance, will be of interest. The notes by Paul Ehrlich on collecting at Hay River, as well as Paul F. Bruggemann's experience at Alert will be described in a later issue of the News.

*The term "northern transition" is used here as approximately equivalent to "Hudsonian" of the Merriam classification.

SOCIETY AFFAIRS

PROPOSED AMENDMENTS TO THE CONSTITUTION

The following alterations and amendments of the Constitution of the Lepidopterists' Society have been transmitted by the Secretary for publication, as provided in Article XII, Section 1:

A. Replace Art.III, Sec.4 with: "Section 4. Application for membership in the Society, received by the Secretary or Treasurer and accompanied by the annual dues for the current year, shall constitute formalization of membership, and no nomination or election to membership shall be necessary. This section shall be retroactive."

B. Art.III, Sec.6, add: "Life Membership fees shall be placed in a Permanent Publication Fund."

C. Add to Art.III: "Section 9. The Executive Council may expel any member of the Society for such cause as it may deem sufficient for expulsion. This action may be taken only after unanimous approval by the members of the Council. Petition for expulsion shall be presented to the Secretary for presentation to the Council. On expulsion, the departing member shall be refunded all dues paid for the current year. An expelled member may be reinstated by unanimous affirmative vote of the Council."

D. Change "Committee" to "Council" in the following sections:

Article IV: Secs.2, 3 (twice), 4, 5(thrice);
Article V: Secs. 1 (twice, 2;
Article VI: Secs.4, 5, 7 (twice);
Article VII: Sec.1;
Article IX: Sec.1;
Article XI: Sec.1;
Article XII: Sec.2.

E. In Art.VI, Sec.1, delete: ", except the Executive Committee,"; change "Chairman of the Executive Committee" to "Chairman of the Executive Council."

F. Art.IV, Sec.2, add: "Action on all amendments to the By-laws and all appointments and elections by the Executive Council shall be obtained by a canvass by the Secretary of all members of the Council."

G. Art.V, Sec.1, add: "For each office, the nominee receiving the highest number of ballots shall be elected. Officers shall take office at the beginning of the calendar year for which they are elected."

H. Art.VI, Sec.2, add: "before the first of July" in first sentence between "shall" and "appoint". Delete "with the issue of The Lepidopterists' News". Transfer this section as amended, to become Section 1 of Article V, the original "Section 1" becoming "Section 2" and the original "Section 2" becoming"Section 3".

I. Art.VI. Change original Sections "3", "4", "5", "6", "7", "8", "9" to "2", "3", "4", "5", "6", "7", "8" respectively. In the resultant "Section 2", change "Senior Vice President" to "First Vice President".

J. Art.VIII, Sec.1, delete second sentence and substitute: "Each volume shall be issued for a calendar year, the number of issues to be fixed by the Editors in consultation with the President and Secretary. In it shall be published the proceedings of the annual meetings. A list of the members of the Society shall be issued each year."

K. Art.XI, Sec.4: delete entire section (to be replaced as a By-law if at all).

L. Art.XII, Sec.1, insert at end of first sentence: ", or voting by mail ballot".

M. Art.XII, Sec.1, insert after first sentence: "Each proposal for amendment must be signed by not less than five members of the Society and submitted to the Secretary who will promptly transmit it to the Editor-in-Chief."

N. Art.XII, Sec.2, replace entirely as follows: "The By-laws may be altered, amended, or repealed, by a majority vote of the members voting, at any meeting of the Executive Council or in a mail-canvass of the Council by the Secretary. All changes so validated shall be published in The Lepidopterists' News."

DUES INCREASED IN BY-LAW AMENDMENT

By action of the Executive Council (January, 1952), Section 1 of the By-laws is replaced by the following: "Section 1. Beginning with 1952, the annual dues for Active Members shall be Three Dollars, U.S.A. (U.S.A. $3.00), except that students less than twenty-five (25) years of age shall be required to pay only Two Dollars ($2.00), U.S.A., per annum. Active Membership shall include a subscription to The Lepidopterists' News."

The Council ruled that 1952 dues of members outside North America received before this change became known shall be regarded as paid in full even though at the 1951 rate.

NEWS TO BE LETTER-PRESS PRINTED; ASSISTANT TREASURER APPOINTED

The Executive Council also approved the publication of The Lepidopterists' News by letter-press printing, beginning with Volume 6. Further, as provided in Art.IV, Sec.3 of the Constitution, the Council appointed JOSEPH MUELLER, of Short Hills, New Jersey, U.S.A., as Assistant Treasurer. Mr. Mueller will render important service to the Treasurer and Editor-in-Chief.

(continued from page 66)

by F. Martin Brown
Colorado Springs, Colo.

V. DISTRIBUTION CURVES

All of the statistics outlined in sections I through III are based upon what is called "The Normal Curve of Error". When this curve is plotted graphically it is found to be symmetric about the mean. It is the curve that would be formed by plotting n for each class of a perfect variable. Tables for constructing this curve are found in most books on statistics and in many books of mathematical tables.

So long as the data being examined conform to the Normal Curve of Error the standard statistical procedures will yield satisfactory results and conclusions based upon them carry weight. As soon as the array of data deviates SIGNIFICANTLY from the pattern of the Normal Curve the simple statistical procedures give way to more complicated ones.

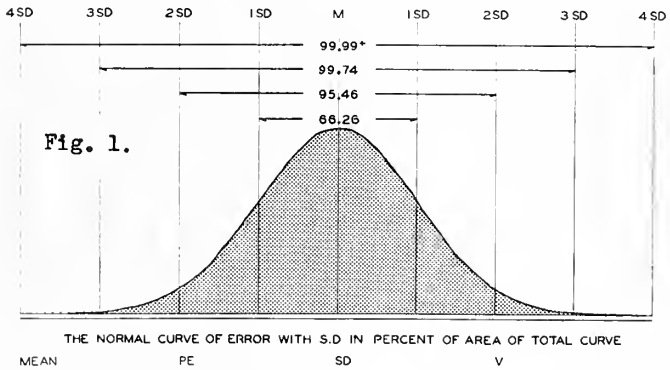


Fig. 1.

Since this curve seems to be so important let us look at it (Figure 1, above) and at some of its properties. The area of the curve that lies between the lines indicating one standard deviation either side of the mean is 68.26% of the entire surface of the curve. This means that 68.26% of the individuals composing a perfect variable will differ from the mean of all of the individuals by no more than one S.D. Areas of the Normal Curve in terms of the mean, plus and minus certain fractions of S.D., are converted to percent of the total area of the curve in Table 9.

TABLE 9.

The Areas of the Normal Curve of Error in S.D. and Percent

Area in S.D.	Equivalent percent
M ± 0.5 S.D.	38.30
M ± 1.0 S.D.	68.26
M ± 1.5 S.D.	86.64
M ± 2.0 S.D.	95.46
M ± 2.5 S.D.	98.76
M ± 3.0 S.D.	99.74
M ± 3.5 S.D.	99.96
M ± 4.0 S.D.	99.99

From this table it can be seen that the mathematical chance for the occurrence of an individual differing by 4 S.D. from the mean of the population to which it belongs is 1 in 10,000; by 3 S.D. about 26 in 10,000; by 2 S.D. about 454 in 10,000; and by 1 S.D. about 3,174 in 10,000. Another way of looking at Table 9 is to say that if you have a perfectly random sample of 100 specimens from a homogeneous population, then on the average, 5 specimens will differ from the mean of the sample by more than 2 S.D.

In section III certain percent limits were used, i.e., 95% limits and 99% limits. In section I the factor 0.6745 was used in calculating $p.e._m$. These limits and factors are related to the area of the curve cut off by definite amounts of S.D. either side of the mean.

TABLE 10.

Useful Percent Limits in Terms of Mean ± S.D.

50% limits	equal	Mean ± 0.6745 S.D.
95% limits	equal	Mean ± 1.96 S.D.
99% limits	equal	Mean ± 2.575 S.D.
99.9% limits	equal	Mean ± 3.29 S.D.
99.99% limits	equal	Mean ± 3.86 S.D.

The great majority of natural variables fall into the pattern of the Normal Curve of Error. However, some do not. The data from such a variable are crowded to one end of the curve and the curve is asymmetrical. Such a curve is called a skewed curve (Figure 2). I will not attempt to show the mathematics involved in treating data from such a curve. It is not simple!

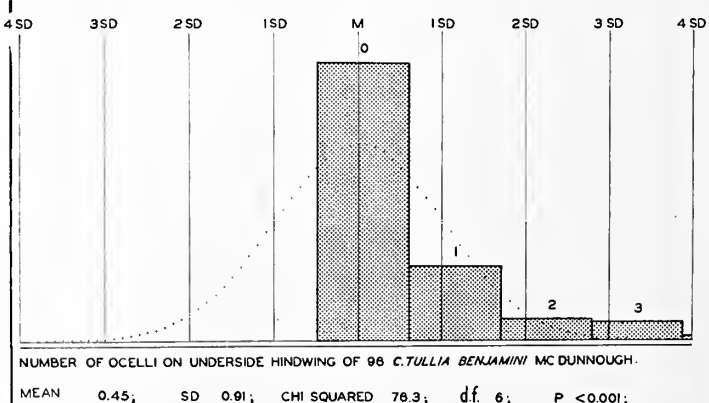


Figure 2.

Brown: SIMPLE STATISTICS FOR THE TAXONOMIST - cont.

VI. CHI-SQUARED TESTS

Sometimes the limited sample available does not allow the investigator to decide by inspection whether or not the data form a normal or a skewed curve. If there is any reason to doubt the curve being normal the data can be tested for "Goodness of Fit" to the normal curve by the Chi-squared test (χ^2). This test produces a convenient index of the deviation of the data from a Normal Curve. It is a simple test to apply but it does involve a number of steps. Here is how it is done.

THE PROBLEM: Do the data concerning the radius of the forewing of Plebejus s. saepiolus (Bdv.) fall into a Normal Curve of Error? (Figure 3)

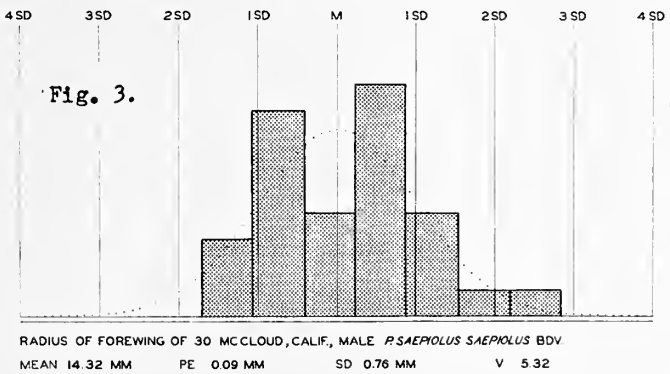


Fig. 3.

THE SOLUTION: Let us take the data from the McCloud series that was used in the first article. This is treated as though it was a normal curve sample and the S.D. determined. Once this is done, these data may be laid out on an eleven-column work sheet -- I use regular accountant's ruled work sheets.

Before doing anything else let me explain how Table 11 was constructed. It really is not as formidable as it looks!

Class: Divide the actual measurements into uniform classes so no class contains no example. At each end lump the rest of the curve into single classes to fill out the curve.

f_o : This is the observed frequency. It is the number of specimens that fall into each class.

d_m : The difference from the mean, calculated by subtracting the mean from the lower limit of each class (or vice versa).

$\frac{d_m}{S.D.}$: The difference from the mean translated into S.D. This is done by dividing d_m by S.D.

AREA: The data for this must be taken from a table of areas for the Normal Curve of Error. The information wanted is the area of the Normal Curve between the lower limit of each class and the mean.

Class Area: This is the area of the Normal Curve occupied by each class. This is found by subtracting adjacent AREAS. Take care as you come to the class containing the mean. In this case it is the sum.

TABLE 11.

Calculation of Chi-squared for Goodness of Fit to the Normal Curve of Error

Example: Radius of the Forewing of the McCloud, Calif., series of 30 male P. s. saepiolus

N = 30 mean = 14.32 mm. S.D. = 0.76 mm.

Class	below 12.9	13.0-13.4	13.5-13.9	14.0-14.4	14.5-14.9	15.0-15.4	15.5-15.9	16.0-16.4	above 16.5
f_o	0	3	8	4	9	4	1	1	0
d_m		-1.23	-0.82	-0.32	0.18	0.68	1.18	1.68	2.18	
$\frac{d_m}{S.D.}$		1.74	1.08	0.42	0.24	0.89	1.55	2.21	2.87	
AREA	0.5000	0.4591	0.3599	0.1628	0.0948	0.3133	0.4394	0.4865	0.4980	0.5
Class Area	0.0409	0.0992	0.1971	0.2576	0.2185	0.1261	0.0471	0.0125	0.0020	
f_c	1.23	2.98	5.92	7.98	6.56	3.78	1.41	0.37	0.06	
f_o	0	3	8	4	9	4	1	1	0	
f_c-f_o	1.23	0.02	2.08	3.98	2.44	0.22	0.41	0.43	0.06	
$(f_c-f_o)^2$	1.5129	0.0004	4.3264	15.8404	5.9563	0.0484	0.1681	0.3969	0.0036	
$\frac{(f_c-f_o)^2}{f_c}$	1.23	neg.	0.74	1.98	0.91	0.01	0.12	1.07	0.06	

Chi-squared = 6.12 d.f. = 8 P = 0.63

f_c : The calculated frequency is found by multiplying the number of specimens in the entire series being studied by the Class Area, a decimal fraction. Slide-rule accuracy is sufficient.

f_o : The observed frequency noted above.

$f_c f_o$: The difference between the calculated frequency and the observed frequency. Take no notice of the algebraic sign (+ or -).

$(f_c-f_o)^2$: The square of the difference just calculated.

$\frac{(f_c-f_o)^2}{f_c}$: The square just calculated, divided by the calculated frequency. The sum of these quotients is called Chi-squared, the number we are seeking.

To interpret Chi-squared it is necessary to use prepared tables. A reference to a full set of them is given after my much abbreviated Table 12. To use these tables two things must be known, Chi-squared and the number of degrees of freedom (d.f.) used. If you subtract 1 from the total number of classes used, including the terminal ones with no examples in them (nine classes were used in my Table 11), you will have d.f. From Chi-squared and d.f. you find in the Table of Probabilities the chance that your sample was drawn in such a way that it conforms with the Normal Curve of Error.

TABLE 12.

Chi-squared for Various Degrees of Freedom and Probabilities that Data Fit Normal Curve

d.f.	P=0.99	P=0.95	P=0.50	P=0.05	P=0.01
1	.000	.004	.455	3.841	6.635
2	.02	.10	1.39	5.99	9.21
3	.11	.35	2.37	7.82	11.34
4	.30	.71	3.36	7.49	13.28
5	.55	1.15	4.35	11.07	15.07
6	.87	1.64	5.35	12.59	16.81
7	1.24	2.17	6.35	14.07	18.48
8	1.65	2.73	7.34	15.51	20.09
9	2.09	3.33	8.34	16.92	21.67
10	2.56	3.94	9.34	18.31	23.21
15	5.23	7.26	14.34	25.00	30.58
20	8.26	10.85	19.34	31.41	37.57
25	11.52	14.61	24.34	37.65	44.31
30	14.95	18.49	29.34	43.77	50.89

In our example Chi-squared is 6.12 and d.f. is 8. Using these we find from the tables that P equals 0.63. This means that 63 out of 100 random samples of 30 with a d.f. of 8 drawn from the same population will differ more than does our sample from the Normal Curve of Error. I am not too critical of my sample until Chi-squared yields a P that is 0.01 or less.

It should be evident from the method involved in the calculation of Chi-squared that Chi-squared is an expression of the difference between the observed sample and a perfect sample with the same parameters drawn from a population that falls into a Normal Curve of Error.

This is the way the table is read: Suppose we have calculated Chi-squared as 16.24 with 8 degrees of freedom. Then P will be closer to 0.01 than to 0.50 and some doubt may be cast upon the chance that the data fit the Normal Curve of Error. If with 8 degrees of freedom we get a Chi-squared of 25.09 we know that there is less than 1 chance in 100 that the data fit the Normal Curve. (Full tables for this will be found as Table III in Fisher's Statistical Methods for Research Workers, Oliver and Boyd, Edinburgh, 1944.)

There are other uses of Chi-squared to test the Goodness of Fit of theory to observation. One of these that is very useful is the "Four-fold Table". It can be used when there are two pairs of attributes. For example, a character that I call "rusty" occurs among specimens of Heliconius charitonius. It is a dusting of rusty scales over the yellow bands and the upper surface of the wings.

PROBLEM: Is "rusty" linked with the female sex or is its apparent association with this sex an illusion created by my sample?

SOLUTION: The four-fold table is ideal for aiding in the solution of a problem like this. The first thing is to construct a table like Table 13.

TABLE 13.

The Observed Frequency of "Rusty" in the Florida Population of H. charitonius

	Males	Females	Totals
With "rusty"	5 (4%)	62 (62%)	67
WITHOUT "rusty"	119 (96%)	38 (38%)	157
Totals	124	100	224

The next step is to think out clearly the implications of the theory being tested. We want to know this: Is "rusty" a characteristic of the females? If this is true, then 100% of the females and none of the males should show the characteristic in question. Under these conditions the theoretical frequencies for "rusty" are those shown in Table 14.

TABLE 14.

Theoretical Frequencies for "Rusty" Under Certain Conditions

	Males	Females
With "rusty"	0%	100%
Without "rusty"	100%	0%

We want statistics to tell us the chance that we are taking in assuming from our sample that "rusty" is a female characteristic. Thus the higher the number we get for Chi-squared the less will be the chance that in an infinitely large series we would find the frequencies for "rusty" to be the same in males and females.

The equation for Chi-squared in the case of a Four-fold Table is this:

$$\chi^2 = \frac{(ad-bc)^2 N}{(a+b)(c+d)(a+c)(b+d)}$$

where the letters have these meanings

a (the northwest corner of Table 13), males showing rusty,

b (the northeast corner), females showing rusty,

c (the southwest corner), males without rusty, and

d (the southeast corner), females without rusty.

N is as usual the number of specimens involved.

A little pencil work will show that when there is perfect agreement between the observed and theoretical frequencies, Chi-squared will equal N. Similarly, when there is absolutely no agreement between the two, Chi-squared will equal 0.

Substituting our observed data in the above formula and then solving for Chi-squared we get:

$$\text{Chi-squared}(\chi^2) = \frac{(190-7378)^2 \times 224}{67 \times 157 \times 124 \times 100}$$

$$\chi^2 = 88.73$$

In the case of the Four-fold Table d.f. is 1. Under these conditions, Chi-squared = 3.8 is exceeded by 5 out of 100 cases and 6.6 is exceeded by 1 out of 100 cases. Thus with Chi-squared = 88.7 the chance that our thesis is wrong is very small. I think we can say with a high degree of confidence that "rusty" is a female characteristic.*

[* Mr. Calhoun makes this very pertinent remark: "Could not other hypotheses conceivably lead to the same results as the sex-linked hypothesis? Thus it is probably correct to say 'association exists', but our evidence is drawn from the poor success of the opposite hypothesis. In other words, the evidence does not help in the choice among all imaginable alternatives". My answer to Mr. Calhoun's question is: Yes, there may be other hypotheses that will explain the observed condition, but since the observed condition is of a class most frequently sex-linked the sex-linked solution is more likely correct. This is not the place to present all of the supporting data. That will be done in a publication devoted to the biometry of Heliconius charitonius.]

The occurrence of a few males with "rusty" may indicate that the gene or genes responsible for the characteristic occasionally "cross-over" or that the combination that produces "rusty" tends to be lethal in males. Only extended breeding experiments will give us the answer. It is worth trying.

There are other ways for using Chi-squared to test a theory. Any good book on general statistics will show how they are applied. The thing to remember about Chi-squared is this: "It is a statistical device to measure the deviation of a set of observations from what might be expected if the observed phenomenon is assumed to fall in line with the Normal Curve of Error.

VII. PROBITS

Mr. Calhoun has suggested that I include a brief outline of how the normality of a distribution may be tested by a simple graphical method using probits. One great advantage to the probit method is that it allows easy conversion of the raw data to some other form such as the logarithm, square, square root or any other factor. Such procedure is often most illuminating. Taking the data used in Table 11 and rearranging it we have Table 11A.

TABLE 11A

Test for Normality by the Probit Method

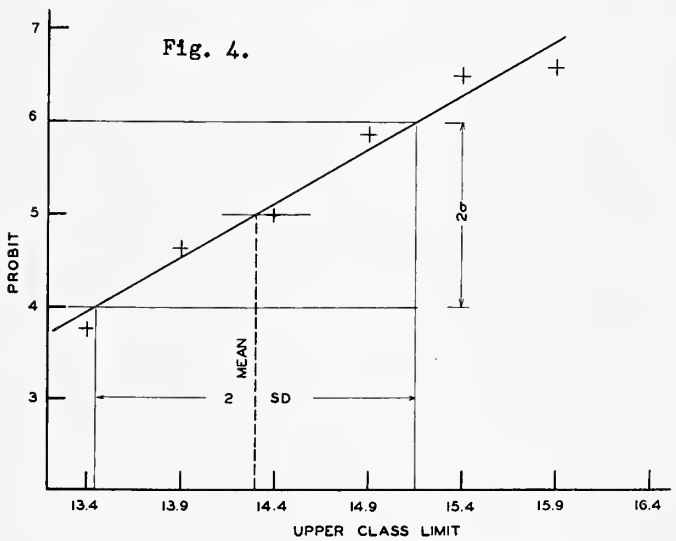
Upper Class Limit	Frequencies	Cumulative Frequencies	Cumulative Percentages	Probit
13.4	3	3	10	3.72
13.9	8	11	37	4.67
14.4	4	15	50	5.00
14.9	9	24	80	5.84
15.4	4	28	93	6.48
15.9	1	29	96	6.75
16.4	1	30	100	∞

The columns are obtained this way:

1) Upper Class Limits, this is self explanatory;
2) Frequencies, the number of cases falling within the class;
3) Cumulative Frequencies, the progressive summation of column 2;
4) Cumulative Percentage, the number in column 4 divided by the total number of cases and multiplied by 100 (in our case divided by 30);
5) The probit, from Table IX in Fisher and Yates or computed from any table of areas of the Normal Curve of Error in this manner: for cumulative percentages BELOW 50 subtract them from 50, for those ABOVE 50 subtract 50 from the cumulative percentage; for each of the remainders enter the AREA column of the table and read the x/σ opposite it; affix a minus sign to those x/σ derived from cumulate percentages less than 50; add 5 to each of these numbers taking care to observe the sign and this will give you the probit.

EXAMPLE: In our problem the first cumulative percentage is 10. This from 50 gives us 40 (0.40). In the area column the nearest we come to this is 0.3997 opposite which $x/\sigma = 1.28$ is found. Since our cumulative percentage was less than 50 this number is given a minus sign, -1.28 and when 5 is added to it we get 3.72 as the probit.

Fig. 4.



The next step is to lay out a graph similar to that in Figure 4. Plot as x's each upper class limit and its probit. Locate the point of the mean on the upper class limit scale and draw it in as a line. Lay off on each side of this line parallel lines that indicate the position of one S.D. each side of the mean. Where these outer lines intersect the lines for probits 4.00 and 6.00, set points. Connect these two points. If your x's lie reasonably close to this line and there is no constant tendency for them to wander from it the distribution may be considered normal. If the plot does not look normal try transforming the raw data.

VIII. COEFFICIENT OF VARIATION

Just as annoying as a qualitative statement of the difference in size between two entities is a statement like this, "Species A is a lot more variable than Species B." Immediately you ask yourself how variable is Species A? What does the author mean by "a lot more"? There is a convenient and very easily calculated Coefficient of Variation (V) that allows a precise statement of the degree to which a species varies in a particular measurement. The coefficient is the index derived by dividing the S.D. by the mean of the measurement and multiplying the resultant number by 100.

$$V = \frac{S.D. \times 100}{\text{mean}}$$

Unfortunately I do not have at hand a great deal of information about the Coefficient of Variation in insects. To convey some idea of how much V itself may vary in one species and to give a scale for comparison with insect-derived V's, let me summarize a long table that deals with variation in man. (See Pearl, Medical Biometry and Statistics, 3rd Ed., W.B. Saunders, Philadelphia, 1940, pp.356-359 for the full table.)

TABLE 15.

The Range of V for Certain Measurements on Man

Measurement	V
Oral temperature	0.49
Skeletal dimensions	2 to 7
Skeletal indices	3 to 12
Volumes and most weights	5 to 35

In Table 16 are a few V's for butterflies. Full data are being published elsewhere in various papers.

TABLE 16.

Some Butterfly Coefficients of Variation

Measurement	Species	Strain	V
radius of forewing	H.charitonius	Florida	9.5
" " "	" "	Mexico	8.2
" " "	" "	Colombia	6.7
" " "	C. tullia	Manitoba	3.9
" " "	" "	Colorado	3.7
" " "	" "	Arizona	3.6
ocelli on underside of hindwing	" "	Manitoba	1.4
" " "	" "	Colorado	5.4
" " "	" "	Arizona	2.0

A glance at Tables 15 and 16 immediately reveals that V for the characters enumerated in Table 16 for insects is generally rather low. It will take many hundred sets of measurements to determine if this is a general rule among insects or the result of my very small group of determinations. None of the more than 30 V's calculated for H. charitonius is greater than 15. Since all of the determinations made are based upon dimensions and indices it is suggested by Table 15 that they will be low. Compared with man the butterflies that I have studied seem to be a little more variable.

In Table 16 the last group of data is based upon frequency measurements. When computing V for frequencies a little care must be taken. For instance, Coenonympha tullia benjamini (McD.) from Manitoba showed as frequency for ocelli on the underside of the hindwing $3.8 \pm 1.3\%$ of the total number possible. The standard formula noted at the end of the first paragraph (p.116) would give us

$$V = \frac{1.3 \times 100}{3.8}$$

$$= 34.2$$

However, lack of ocelli rather than presence of ocelli is the character of C. t. benjamini. So what we want is the frequency with which ocelli are absent, not present, for our calculation of V for the pattern. This is $96.2 \pm 1.3\%$. For this, V is 1.35.

With the data for C. tullia and H. charitonius before me let me digress for a few lines. It is interesting to note the effect of a strong primary pattern upon taxonomists. There is nothing bold about the pattern of C. tullia, so taxonomists have noted the details of the pattern and named dozens of "subspecies". On the other hand H. charitonius is characterized by a bold pattern of yellow bands on a black ground. This makes the species easily recognized. For a century and a half this species remained taxonomically undivided. Roeber then set aside the small broad-banded strain found on the island of Jamaica as H. c. simulator. More recently Hall cut out the St. Kitts strain, on the basis of the well developed secondary pattern of yellow dots on the forewing, as H. c. punctata. A study just published, made by William P. Comstock, recognizes seven subspecies based upon constant pattern differences that have been verified statistically.

Getting back to the Coefficient of Variation, it has been shown above that with it definite statements can be made about variability. It has been shown that the Colorado strain (ochracea) of C. tullia is almost four times as variable as is the Manitoba (benjamini) strain as far as pattern is concerned, but that as far as size is concerned the two subspecies are about equally variable. Probably it is not necessary to go further to show how this statistic can be used and interpreted.

IX. COEFFICIENT OF CORRELATION

Very often the investigator gets a feeling that two characters are in some way related. It is desirable to test this "hunch" and to be able to say with some precision how close the relationship is if it is proved to exist. Looking at the data on wing radius for H. charitonius in Table 16, one feels that there may be some relationship between latitude and variation in size.

PROBLEM: Does H. charitonius vary more in size the farther north the source of the population is sampled?

SOLUTION: The presence or absence and the degree to which this apparent relationship exists can be fixed by using the Coefficient of Correlation. There are several ways for computing this factor (r). I prefer to use a modified power-moment method and will explain it. The basic data needed are given in the first two columns of numbers in Table 17.

TABLE 17.

The Mid-latitude (L) and V for Forewing Radius for Certain Strains of H. charitonius Males

Strain	L° N	V	$L-m_L$ $(=d_L)$	$V-m_V$ $(=d_V)$	$d_L d_V$
Florida	27.5	9.5	+9.5	+1.9	+18.05
Cuba	22.0	7.7	+4.0	+0.1	+0.40
Mexico	23.0	8.2	+5.0	+0.6	+3.00
Hispaniola	18.5	8.0	+0.5	+0.4	+0.20
Jamaica	18.0	6.9	0.0	-0.7	0.0
Puerto Rico	18.0	5.9	0.0	-1.7	0.0
Virgin Islands	18.0	6.7	0.0	-0.09	0.0
Cent. America	12.0	8.8	-4.0	+1.2	-4.80
Colombia	5.0	6.7	-13.0	-0.9	+11.70
				Algebraic sum	+28.55

The first step is to find the mean and the S.D. of the two variables. For L these are 18.00° and 6.30°; for V these are 7.60 and 1.14.

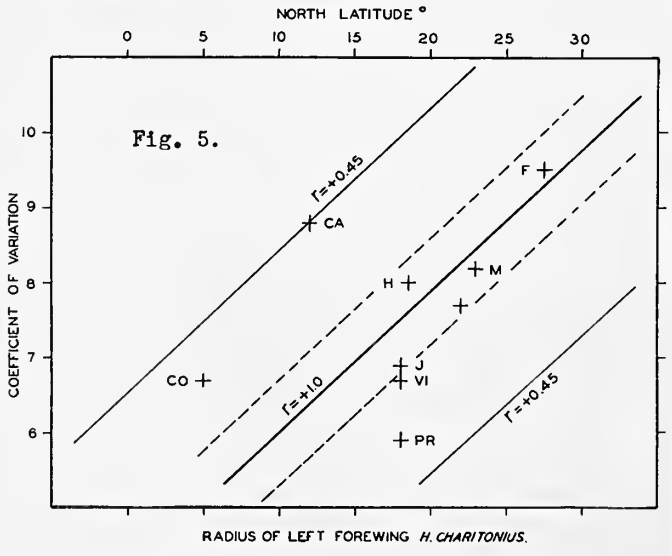
During these computations the differences from the means were used. These are again used in the second step. Here it is important to note the algebraic signs (+ and -). In the case of each strain the differences from the means of V and L are multiplied. If the signs are alike the product bears the plus sign, if they are unlike a minus sign. The results of this step form the last three columns of Table 17.

The last step is to divide the algebraic sum of the products of the deviations by the product of three items, the two S.D. and the number of cases (strains in this instance), as follows:

$$r = \frac{+28.55}{1.14 \times 6.30 \times 9} = +0.446 \pm 0.24$$

The best way to test r for significance is to determine whether it is really different from r = 0. The test number is the standard error of r if it were 0 and the same number of cases had been used. The S.E. under these conditions is determined by dividing 1 by the square root of the number of cases. In our example we have 1 divided by 3, thus S.E. is 0.33. This means that with only 9 cases, r must be greater than 0.33 to be significantly different from 0. Our example with r = 0.446 is therefore possibly significantly greater than zero. When r is less than twice the S.E. for r = 0, I am inclined to hedge my statement of relationship. In this case I would feel safe in saying there seems to be a definite demonstrable tendency for H. charitonius to be more variable in size the farther north is the source of the strain.

There is something else that r indicates in addition to whether or not the relationship really exists: how completely the relationship is established. Probably the best way to explain the interpretation of this from r is to use a diagram (Figure 5), but first something about the limits of r should be explained. The Coefficient of Correlation ranges from -1.0 to +1.0. In either case unity is the measure of perfect correlation. When r is -1.0 it means that the larger is one of the variables, the smaller is the other. When r is +1.0 it means that as one variable increases the other does. When r is 0 there is no relationship between the two variables. In our sample r was +0.45. This is a measure of the dispersal from a straight-line relationship expressed by r = +1.0.



On the diagram the intersection for V and L has been plotted for each of the 9 cases. If r had equaled +1, then all of the intersections would have fallen on the central diagonal line labelled r = +1.0. As it is, the data fall within a rather broad band, the limits of which are marked by the solid lines paralleling the central diagonal. The Coefficient of Correlation is a measure of the width of this band. If r had been +0.9 then all of the cases would have fallen between the boundaries established by the parallel broken lines. As it is, two-thirds of the samples fall within a band of the width required for r = 0.90. This suggests that some other factor may be present and more effective than latitude for the samples from Colombia, Central America, and Puerto Rico.

When working with insects, I interpret significant Coefficients of Correlation more or less in this fashion:

r	degree of relationship
under 0.20	of little importance
0.21 - 0.30	some tendency toward a relationship
0.31 - 0.50	a well-developed tendency toward a relationship
0.51 - 0.70	a definite but somewhat vague relationship is evident
0.71 - 0.85	a well-defined relationship
0.86 - 0.95	a sharply defined relationship
0.96 - 1.0	an absolutely dependable relationship.

Such phrases are helpful for persons not too familiar with the philosophy behind r. It must be borne in mind that this interpretation is based upon TRUE CORRELATION and that we can calculate only an ESTIMATE OF CORRELATION. This demands of the interpreter careful additional consideration of the situation from points of view other than the statistical. To researchers well-versed in statistics the numbers alone tell more than these phrases or any other phrases can.

By using the mean radius for each of the above samples and substituting it for V in the problem, r proves to be +0.65 ±0.19. This is definitely significant and indicates a definite direct relationship between size and latitude. It is of more than passing interest to note at this point that so far as H. charitonius is concerned this is a reversal of Bergmann's Law. It would be worth the time of students to go more deeply into the relationship of size to northing and southing of latitude. Bergmann's Law has a good physiological basis for warm-blooded animals. Perhaps in cooler climates larger size affords insects more area for absorption of the sun's energy.

The technique for arriving at r that has been outlined is all very well and easy to use when there is a limited number of cases. When I have a series that runs above 30 I use a system that groups my examples into classes. This is not quite so accurate as dealing with each example separately but is much less time-consuming. Any good text-book on statistics will explain how it is done. The fundamental

formula for the Coefficient of Correlation is

$$r = \frac{S\,(d_1 d_2)}{N \times S.D._1 \times S.D._2}$$

and for its Standard Error (S.E. is equivalent to the S.D. of a mean) is

$$S.E. = \frac{1 - r^2}{\sqrt{N}}$$

X. LUTZ' COORDINATES

When studying the community of species of a particular area rather than a sample drawn from the population of a single species, the investigator may be confronted with the problem of expressing the geographic affinities of the association of species. A method proposed by the late Dr. Frank E. Lutz that has always impressed me with its possibilities was, I believe, outlined in the Bulletin of the American Museum of Natural History during the first decade of the Century.

Dr. Lutz suggested approaching the problem this way. List the normal species for the area, and adjacent to each place the coordinates of the geographic center of the SPECIES range. Then the average of the longitudes and the average of the latitudes will give the coordinates that express the geographic focus of the association. I believe that the reason Lutz' coordinates have not been used is the difficulty of defining a species and the lack of concrete knowledge of the range of the members of a community. The method will be applied to two collecting localities in Colorado about 25 miles apart horizontally and 6000 feet apart vertically. The lower station is my home, Fountain Valley School; the upper station is Glen Cove, just above tree-line on Pikes Peak.

PROBLEM: What is the geographic expression for the difference in the association of butterflies (excluding Hesperiidae) found at Fountain Valley School and at Glen Cove?

TABLE 18.

Fountain Valley association			Pikes Peak association		
Species	°long.	°lat.	Species	°long.	°lat.
Papilio multicaudatus	110	30	Parnassius smintheus	125	50
Papilio rutulus	113	40			
Pieris protodice	95	38	Pieris napi	100	50
Colias eurytheme	95	35	Colias meadii	110	48
Nathalis iole	90	28			
Eumenis ridingsii	110	45	Coenonympha tullia	100	50
Minois damei	113	38	Oeneis lucilla	107	40
			Oeneis chryxus	110	48
			Erebia epipsodea	105	48
Phyciodes tharos	95	30	Speyeria eurynome	115	45
Phyciodes ismeria	100	33	Boloria helena	108	40
			Boloria aphirape	100	50
			Boloria freija	100	50
			Euphydryas anicia	117	47
			Nymphalis milberti	100	50
Plebejus melissa	105	48	Plebejus aquilo	100	50
Plebejus acmon	112	35	Plebejus saepiolus	100	50
Strymon melinus	95	40	Lycaena rubida	117	40
Hemiargus isolus	90	20	Lycaena helloides	115	50
			Lycaena snowi	117	40
Geographic centers	long.102° lat.35°			long.108° lat.47°	

SOLUTION: The characteristic members of the butterfly fauna of the two stations have been selected and as well as possible the mid-points of their geographic ranges have been determined. The geographic centers tabulated refer to the SPECIES involved and not to subspecies. They also ignore the range outside of the Americas.

The following tabulation can be prepared from the data of Table 18.

	°W. Long.	°N. Lat.
Faunistic Fountain Valley	102	39
Faunistic Pikes Peak	108	47
Faunistic difference	6	8
Geographic difference	0.35	0.12

The faunistic difference in longitude is 17 times as great as the geographic difference and the faunistic difference in latitude is 67 times as great as the geographic difference. The latitudinal difference is of course closely related to the 6000 feet of difference in altitude. The longitudinal difference is not so easily explained. It may be related to the Pleistocene refugia from which the two faunae expanded in Recent time.

This problem emphasizes that the data being gathered by the members of the Society cooperating with THE NEARCTIC BUTTERFLIES project will be invaluable for investigators interested in the geographic aspects of butterflies in North America.

CONCLUDING REMARKS

Now that this series is at an end I hope that it has been shown how some of the problems involved in studying living things can be approached with a higher degree of precision than is generally used. Much more than mathematical precision will result from extended use of accepted statistical procedures. A certain amount of taxonomic caution should evolve from attempts to be precise. That will mean fewer synonyms and less clutter in the literature of Lepidoptera.

To me a far more important result will be the accumulation of a corpus of precise data on the variation of natural populations. In general this is lacking from biological literature. Many questions cannot be adequately answered until such information is available. All too frequently collectors of Lepidoptera forget that an equally important side to assembling and naming properly a collection is to contribute a bit of precise information that in the hands of a more serious biologist now or in the future will add to the formulation of concise and basic biological laws and knowledge. Collections and taxonomy are not an end in themselves; they are merely tools with which the biologist works.

I shall be delighted to correspond with entomologists who are applying or wish to apply statistical methods to enhance their work.

A CORRECTION: LYCAENA HELLOIDES FROM NEW YORK

by Alexander B. Klots

An unfortunate misidentification and misnomer combined occurred in the last Field Season Summary in the Lepid. News (Vol.4: p.103; 1950), when "Lycaena dorcas michiganensis" was recorded from Fishers, Ontario Co., N.Y. Through the courtesy of Mr. Charles Kimball, the collector, I have been enabled to study two of the specimens. They are males of Lycaena helloides (Boisduval) and differ in no significant way from a series of specimens of this species from Illinois. This extends the known range of helloides from Illinois into New York. The combination "L. dorcas michiganensis" is an impossible one, for michiganensis Rawson indubitably applies to a population of the species L. epixanthe (Boisduval); and there can be no question of the specific distinctness of L. epixanthe and L. dorcas (Kirby). It might be interesting to hear some opinions as to the authorship of this impossible combination. Is it Kimball, Rupert, Munroe or Remington? And what was the date of publication of the issue of the Lepid. News in which it occurred?

[Ed.note: The publication date in question will be found on a back page of this issue. The authorship is conspicuously shown on p.102 of the 1950 Season Summary, but of course Dr. Munroe was setting forth the collector's record as he received it. C.L.R.]

IMPORTANT ANNOUNCEMENT

The 1952 meeting of the Lepidopterists' Society will be a combination of field trips and regular formal sessions. At the invitation of the lepidopterists in the Canadian Division of Entomology, this meeting will be held at Ottawa, Ontario, from July 2-5, 1952. For several reasons, this will be an especially attractive meeting: 1) the promise of interesting collecting; 2) the presence of the great Canadian National Collection, assembled in large part under the Society's first President, Dr. J.H. McDunnough; 3) the host members, who together make up the largest and most active staff of research lepidopterists in any institution in the Americas; 4) the date, which will allow members from all parts of North America to include the meeting in plans for their summer vacation travels. The regular features of all Society meetings will be found, as well, - stimulating scientific papers and discussions; exhibits of specimens, equipment, and pictures; and personal contacts with numerous confrères.

Further information will follow, but this announcement is given to allow members to plan for the trip.

C.L.R.

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped that eventually our coverage of the world literature will be virtually complete. It is intended that every paper published since 31 December 1946 will be included. In the first four volumes of the Lep. News 1437 were listed. Abstracts give all new subspecies and higher categories with generotypes and type localities. Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members and the many regularly received are gratefully acknowledged. Initials of cooperating abstractors are as follows: [P.B.] - P.F. Bellinger; [A.D.] - A. Diakonoff; [L.G.] - L.A. Gozmány; [G.dL.] - G. de Lattin; [C.R.] - C.L. Remington; [T.S.] - T. Shirôzu. A complete set of these pages, for clipping and filing, may be obtained for Vol.4 for $0.50, and a subscription for Vol.5 for $0.50.

B. SYSTEMATIC

200. Amsel, H. G., "Eine neue deutsche Glyphipteryx-Art (Lep. Glyphipterygidae)" [In German]. Entomon, vol.1: pp.88-89. 1949. Describes as new G. schultzella (Mussen, Lippe, Germany). [P.B.]

201. Amsel, H. G., "Eine neue Ochsenheimeria-Art aus dem Libanon (Lepidoptera - Ochsenheimeriidae)" [In German]. Boll. Assoc. Romana Ent., vol.4: pp.3-4, 1 pl. 1949. Describes as new O. talhouki (Iditah, Lebanon); figures adult and ♂ genitalia. [P.B.]

202. Bernardi, G., "Recherche de la position systématique exacte de trois espèces de Pierini asiatiques (Lep. Pieridae)" [In French]. Bull. Soc. Ent. France, vol.52: pp.156-159, 9 figs. 8 Feb. 1948. Places the spp. davidis, stoetzneri and dubernardi in Pieris rather than in Aporia or Synchloe, on the basis of ♂ genitalia; figures latter for these spp. and representatives of each of the 3 genera. [P.B.]

203. Bernardi, G., "Les Rhopalocères décrits par Geoffroy (Histoire abrégée des insectes qui se trouvent aux environs de Paris, 1785)" [In French]. Rev. Franç. Lépid., vol.12: pp.278-281. "May-June" [11 Dec.] 1950. Reviews placement of 10 names of butterflies; points out that saltator must replace mendolensis for local race of Pararge achine, and regards cephalus as valid ssp. of Coenonympha areania. [P.B.]

204. Berthet, H., "Orodemnias cervini Fallou dans les Alpes françaises du Dauphiné, ssp. (ou forme individuelle?) scriniensis nova" [In French]. Rev. Franç. Lépid., vol.11: pp.369-376, 5 figs. "Oct.-Nov." [16 Dec.] 1948. Describes as new a single specimen found frozen in ice (Glacier Blanc, Hautes Alpes); discusses distribution and variation of this extraordinary alpine arctiid. Figures ♂ genitalia of scriniensis, cervini, and quenseli. [P.B.]

205. Betrem, J. G., "Het genus Lansdownia Heylaerts 1881 (Lep., fam. Psychidae)" [In Dutch, English summary]. Verslag 105e Zomervergadering Nederl. Ent. Veren.: pp.xli-xliii. 15 July 1951. Discusses spp. originally included by Heylaerts in this genus, and fixes Oiketicus fuscescens as type. Proposes walkeriana n. n. for O. boisduvalii Walk., 1855. [A.D.]

206. Bourgogne, Jean, and Jiří Paclt, "Fragmenta Lepidopterologica. 2e note. A propos de Psychidae." [In Czech and French]. Acta Soc. Ent. Čechosloveniae, vol.45: pp.47-50. 1 May 1948. Fumaria has priority over Fumea. Bibliography of literature on the biology of the Psychidae from 1918 to 1946. [P.B.]

207. Boursin, C., "Eine neue Agrotis aus Nord-Persien, Agrotis psammocharis n. sp." [In German]. Ark. for Zool., ser.2, vol.1: pp.355-356, 1 pl. 17 Jan. 1951. Type locality Keredj. Figures both sexes, and ♂ genitalia of this and three closely related spp. [P.B.]

208. Box, Harold E., "Report upon specimens of Diatraea Guild. in the Paris Museum, with description of a new species from Brazil (Lep., Pyral.)." Revista Ent., vol.19: pp.419-422, 2 figs. [31] Dec. 1948. Describes as new D. ragonoti (Petropolis). Figures ♂ and ♀ genitalia. Locality records for 8 other neotropical spp. [P.B.]

209. Box, Harold E., "Notes on the genus Diatraea Guilding (Lepid., Pyral.) (Parts IV and V)." Revista Ent., vol.20: pp.541-555, 3 maps. 31 Aug. 1949. Discusses the taxonomic history of the 4 spp. described during the 19th century; figures distribution of the 3 of these which are South American. Revises the material on Diatraea in the Biologia Centrali-Americana, from a study of the Godman-Salvin collection, giving a list of 10 spp. with localities.[P.B.]

210. Bradley, J. D., "Micropteryx kaltenbachii Wood 1890 synonymous with Eriocrania chrysolepidella Zeller 1851 (Lep. Eriocraniidae)." Entomologist, vol. 84: pp.9-10, 2 figs. Jan. 1951. Synonym based on ♂ genitalia, which are figured. [P.B.]

211. Brown, F. Martin, "The American Papilios." Lep. News, vol.4: pp.39-41, 63-66. "1950" [Jan., May 1951].

212. Brown, F. Martin, "Measurements and Lepidoptera." Lep. News, vol.4: pp.51-52. "1950" [Jan. 1951].

213. Catala, R., and P. Viette, "Capture d'un Delias intéressant en Nouvelle-Calédonie (Lep. Pieridae)" [In French]. Bull. Soc. Ent. France, vol.53: pp.150-151, 1 fig. 28 Jan. 1949. D. ellipsis, previously known only from 2 specimens of uncertain locality, is recorded and figured. [P.B.]

214. Chermock, Ralph L., "A generic revision of the Limenitini of the world." Amer. Midl. Nat., vol.43: pp. 513-569, 67 figs, 1 map. May 1950. Includes the genera Parthenos, Harma, Pseudathyma, Pseudacraea, Lebadea, Limenitis (with subgenera Limenitis and Adelpha), Neptis (with subgenera Neptis and Acea), Catuna, Hamanumida, Euphaedra, Euryphaedra, Euthalia. Synonymizes Basilarchia and Heterochroa under Limenitis and Adelpha respectively; all American spp. are in these 2 subgenera. Discusses phylogeny and distribution; describes venation, ♂ genitalia, and early stages of each genus (when known). [P.B.]

215. Cleu, H., "Une race cévenole de Maculinea alcon Schiff. - rebeli Hirscke" [In French]. Rev. Franç. Lépid., vol.12: pp.257-260. "May-June" [11 Dec.] 1950. Describes as new M. a. taranis (Tanargue, Cévennes); no type mentioned. Food plant Gentiana lutea. [P.B.]

216. Cockayne, E. A., "Two new subspecies of British Geometridae (Lep.)." Entomologist, vol.84: pp.154-155. July 1951. Describes as new: Scopula lactata scotica (Forres, Morayshire, Scotland); Eupithecia vulgata scotica (Aviemore, Scotland). [P.B.]

217. Darlington, Emlen P., "Notes on some North American Lepidoptera reared on Sweet Fern (Comptonia asplenifolia Linnaeus) with descriptions of new species." Trans. Amer. Ent. Soc., vol.74: pp.173-185, 1 pl. 16 Feb. 1949. Describes as new: Gnorimoschema confusatella, Lithocolletis comptoniella, Callisto (Parornix) peregrinaella, Gracilaria asplenifoliatella; all from New Jersey. Figures adults of first three and mines of second and third. Notes on 26 other spp. belonging to 13 families. [P.B.]

218. Dufrane, Abel, "A propos de Danaus (Limnas Hbn.) chrysippus L. (Lep., Danaidae)" [In French]. Misc. Ent., vol.45, no.5: 3 pp. Apr. 1948. Describes as new D. c. joannisi (Hoabinh, Tonkin); also 15 aberrations. [P.B.]

219. Dufrane, Abel, "A propos de Dyselpistis symmathetica Meyrick" [In French]. Bull. Ann. Soc. Ent. Belg., vol.84: p.226. Dec. 1948. Synonym of Penestoglossa dardoinella. [P.B.]

220. Dufrane, Abel, "Microlépidoptères de la faune belge (6e note)" [In French]. Bull. Inst. Roy. Sci. Nat. Belg., vol.25, no.13: 11 pp. May 1949. Describes as new: Stigmella libiezi (Colfontaine Forest, on Prunus padus); S. subtrimaculella (Mons, on 'peuplier du Canada'); also several 'forms' and aberrations. Notes on 29 spp. of various families. [P.B.]

221. Field, William D., "The International Commission on Zoological Nomenclature and the correct name for the North American Monarch Butterfly." Proc. Ent. Soc. Wash., vol.52: pp.234-236. Oct. 1950. Points out that in fixing the type of plexippus as the specimen figured in Holland's butterfly Book the Commission inadvertently affixed this name to the non-migratory South American race of the Monarch; the North American race would thus be D. p. menippe. [P.B.]

222. Field, William D., "Moths of the genus Cincia and three new and closely related genera." Proc. U. S. Nat. Mus., vol.100: pp.311-326, 13 figs. 1950. Describes as new: AMPLICINCIA (type Cincia pallida); A. fletcheri; A. lathyi; A. walkeri; PARACINCIA, P. dognini; PARVICINCIA, P. belli; all from Jamaica. Removes C. nephelistis to Paramulona and returns C. muelleri to Hypoprepia. Redescribes other species of the group; gives a key to genera and spp., and figures genitalia of all spp. [P.B.]

223. Fischer, Ch., "Espèces nouvelles pour la France" [In French]. Rev. Franç. Lépid., vol.12: pp.43-48, 1 pl. "Feb." [2 Apr.] 1949. Describes as new Deroxena venosulella gallica (Digne, Basses-Alpes). New records are 4 spp. of Eupista, Cataplectica profugella, Epermenia kroneella, Hyponomeuta stanellus. Figures ♂ genitalia of first 6 and of Eupista caespititiella. [P.B.]

224. Fleming, Henry, "The Euchromidae (moths) of Kartabo, British Guina, and Caripito, Venezuela." Zoologica, vol.35: pp.209-216. 27 Nov. 1950. Describes as new Autochloris umbratus (Caripito). Describes larva, pupa and cocoon of Poecilosoma chrysis (food plant, sp. of Moriaceae). Records 77 spp. from Kartabo and 44 from Caripito, only 15 being common to both localities. [P.B.]

225. Ford, L. T., "The Plutellidae." Proc. Trans. South London Ent. Nat. Hist. Soc., 1949-50: pp.85-93, 1 pl. Apr. 1951. Account of the 5 genera and 26 spp. found in Britain; figures adults of all. [P.B.]

226. Franclemont, J. G., "The occurrence of Anomis commoda Butler in the United States and its life history (Lepidoptera, Phalaenidae, Catocalinae)." Bull. Brooklyn Ent. Soc., vol.44: pp.69-71. Apr. 1949. Species has been misidentified as A. fulvida; introduced from Orient. Describes larva. Food plant Hibiscus syriacus. [P.B.]

227. Franclemont, John G., "A new moth from Patagonia." Proc. Ent. Soc. Wash., vol.52: pp.40-41, 3 figs. 14 Feb. 1950. Describes as new EUXOAMORPHA, E. eschata (Punta Arenas, Chile). Figures ♂ genitalia. [P.B.]

228. Franclemont, John G., "On the identity of Therina fervidaria Hübner (Lepidoptera, Geometridae, Ennominae)." Bull. Brooklyn Ent. Soc., vol.45: p.90. June 1950. Name must replace athasaria; Hübner's figure matches the second brood of southern "athasaria", which name may be applied to the northern, single-brooded subspecies. [P.B.]

229. Hayward, Kenneth J., "Three new genera for neotropical Hesperiidae (Lep. Rhop.)" [With Spanish abstract]. Acta Zool. Lilloana, vol.5: pp.97-102. 28 Oct. 1948. Describes as new: MELLANA, for Atrytone mella; NYCTELIUS, for Panoquina nyctelius; and EVANSIELLA, for Perichares cordela. [P.B.]

230. Hayward, Kenneth J., "Hesperioidea Argentina XIX" [In Spanish, English abstract]. Acta Zool. Lilloana, vol.5: pp.103-112. 28 Oct. 1948. Adds 8 spp. to the fauna; removes 5. Notes on synonymy include following generic changes: Atrytone urqua to Poanes, Mucia lydora to Oenus, Metrocles oropa to Metron, Vorates mabillei to Lerodea, Carystus artona and C. marcus to Vettius. New localities given for 24 spp. [P.B.]

231. Hayward, Kenneth J., "Nuevas especies de Hespéridos neotropicales (Lep. Hesperiidae)" [In Spanish, English summary]. Acta Zool. Lillcana, vol.5: pp. 175-183, 4 figs. 28 Oct. 1948. Describes as new: Ochlodes aligula decia (Misiones, Argentina): Niconiades nikko (Misiones); Thespeius xarina (Misiones); T. castor (Nova Teutonia, Brazil); Synale sylvanus (Capilla del Monte, Córdoba, Argentina). Figures ♂ of the last three and of Atrytone meridiani and describes ♀ of the latter. [P.B.]

232. Higgins, L. G., "A descriptive catalogue of the Palaearctic Euphydras (Lepidoptera: Rhopalocera)." Trans. R. Ent. Soc. Lond., vol.101: pp1435-499, 7 maps, 41 figs. 30 Dec. 1950. The genus is divided into the maturna group, with 4 spp. (and more in the Nearctic), and the aurinia group with 4 spp., all Palaearctic. These 8 spp. are described, with figures of morphological characters, and distribution maps are given for 7. [P.B.]

233. Hopkins, G. H. E., "The gender of the name Colias." Entomologist, vol.84: pp.175-176. Aug. 1951. Inconclusive comments; question has been referred to the International Commission. [P.B.]

234. Howe, Edwin W. and William H., "Ceratomia kansensis new species (Sphingidae)." Ent. News, vol.61: pp.57-60, 2 figs. May 1950. Type locality Ottawa, Kansas. Figures adult, and venation of this sp., undulosa, and catalpae. [P.B.]

235. Jacobs, S. N. A., "The British Oecophoridae (Part I) and allied genera." Proc. Trans. South London Ent. Nat. Hist. Soc., 1948-49: pp.123-141, 1 pl. Feb. 1950. Covers 8 genera of Oecophoridae, 2 of Blastobasidae, Batrachedra, and Mompha stephensi. Adults and known larvae are described; all spp. except 1 introduced blastobasid are figured. [P.B.]

236. Jacobs, S. N. A., "The British Oecophoridae (Part II)." Proc. Trans. South London Ent. Nat. Hist. Soc., 1949-50: pp.187-203, 1 pl. Apr. 1951. Covers 8 genera, plus Agonopteryx section of Depressaria. Adults of all spp. are figured. [P.B.]

237. Jacquemin, H., "Chlorissa cloraria Hb." [In French]. Lambillionea, vol.50: p.59. 25 June 1950. Differences from C. viridata. [P.B.]

238. Janmoulle, E., "Elachista pulchella Hw., bona species" [In French]. Lambillionea, vol.49: pp.119-123, 1 pl. 25 Dec. 1949. Removes sp. from synonymy under E. humilis; figures ♂ genitalia of these spp. and of E. pomerana and E. subnigrella. [P.B.]

239. Kalis, J. P. A., and L. J. Toxopeus, "Notes on some rare butterflies and moths from the Island of Celebes." Idea, vol.8: pp.92-97. 31 Jan. 1951. Gives field notes and remarks on nomenclature of 7 rare species. [A.D.]

240. Kiriakoff, Sergius G., "On the so-called "lower" taxonomic categories." Lep. News, vol.2: pp.3-4. Jan. 1948.

241. Kiriakoff, Sergius G., "The nomenclature of the specific complex." Lep. News., vol.2: pp.15-16. Feb. 1948.

RECENT LITERATURE ON LEPIDOPTERA - cont.

242. Kiriakoff, S. G., "Recherches sur les organes tympaniques des Lépidoptères en rapport avec la classification. III. Dioptidae" [In French]. Bull. Ann. Soc. Ent. Belg., vol.86: pp.67-86, 2 pl. 6 May 1950. Describes as new EUFORBESIA (type Monocreagra unimacula); divides the family into the subfamilies DIOPTINAE (rudimentary tympana) and JOSIINAE (tympana well-developed). Describes the organs in 16 genera. Regards Dioptidae as ancestral stock of the Notodontoidea, Josiinae being an early offshoot. [P.B.]

243. Klimesch, Josef, "Zur Frage der verwandschaftlichen Beziehungen einiger Stigmella-Arten auf Grund des Baues des männl. Kopulationsapparates (Lep., Stigmellidae)" [In German]. Zeits. Wiener Ent. Ges., vol.33: pp.49-82, 62 figs. 1949. Describes and figures ♂ genitalia and larval mines of 17 European spp. Reviews earlier work on the genus and revises its arrangement. [P.B.]

244. Klimesch, J., "Über die morphologischen und biologischen Unterschiede der Coleophora-Arten linieariella Z. und fulvosquamella H. S. (Lep. Coleophoridae)" [In German]. Zeits. Wiener Ent. Ges., vol.34: pp.55-66, 1 pl., 4 figs. 1949. Describes and figures genitalia of these 2 spp.; discusses larval habits and distribution. Notes on some related spp. [P.B.]

245. Lamont, Norman, and E. McC. Callan, "Moths new to Trinidad, B. W. I." Zoologica, vol.35: pp.197-207. 27 Nov. 1950. Describes as new Megatomis albivia (Noctuidae; Brit.Guiana). Type specimen not identified. Records of 178 other moths, belonging to 29 families, new to Trinidad. [P.B.]

246. Le Marchand, S., "Corrigenda au Catalogue des Microlépidoptères de France et de Belgique" [In French]. Rev. Franç. Lépid., vol.12: pp.233-235. "Mar.-Apr." [25 Sept.] 1950. Atremaea lonchoptera to Lymnaecia, in Cosmopterygidae; Enolmis a synonym of Odites (Cryptophasidae). [P.B.]

247. de Lesse, H., "Étude biometrique des formes d'Erebia epiphron (Knoch), des Vosges, d'Auvergne et des Pyrénées" [In French]. Rev. Franç. Lépid., vol.13: pp.3-9, 3 figs. "Jan.-Feb." [31 Mar.] 1951. Describes as new 'race' mixta (Mont Doré). Analyzes the variation of some pattern characters in local populations. [P.B.]

248. Lhomme, Léon, "Eidophasia aereolella nova sp." [In French]. Rev. Franç. Lépid., vol.12: p.98. "May-June" [7 Dec.] 1949. Type locality "gorges du Cady, au pied sud-ouest de St.-Martin-du-Canigou". [P.B.]

249. Loritz, J., "Sur une nouvelle race locale de Thais rumina medesicaste Illiger (australia Esp.) dans la vallée du Var supérieur" [In French]. Bull. Ann. Soc. Ent. Belg., vol.87: pp.130-132. 5 July 1951. New 'race' daluisensis (Daluis, Var Valley, France) is described. Discusses the distribution and variation of the species. [P.B.]

250. Marion, H., "Contribution à l'étude des Crambus paléarctiques. I. Crambus digitellus H.-S." [In French]. Rev. Franç. Lépid., vol.12: pp.125-128. "May-June" [7 Dec.] 1949. C. petrosellus is a synonym. [P.B.]

251. Marion, H., "Mecyna auralis de Peyerimhoff, bona species" [In French]. Rev. Franç. Lépid., vol.12: pp.203-206, 2 figs. "Jan.-Feb." [12 July] 1950. Distinguishes sp. from M. trinalis; figures ♂ genitalia of both. [P.B.]

252. Marion, H., "Contribution à l'étude des Crambus paléarctiques. II. - Crambus craterellus Sc. et cassentiniellus Z." [In French]. Rev. Franç. Lépid., vol.12: pp.236-240, 1 pl. "Mar.-Apr." [25 Sept.] 1950. Distinguishes these 2 spp., figuring adults and ♂ genitalia. [P.B.]

253. Marion, H., "Contribution à l'étude des Crambus paléarctiques. III. - Le groupe craterellus en Europe occidentale et en Afrique du Nord" [In French]. Rev. Franç. Lépid., vol.12: pp.261-277, 1 pl. "May-June" [11 Dec.] 1950. Describes as new C. m. maghrebellus (Rabat, Morocco); C. m. rungsellus (Aguelmane de Sidi, Atlas Mts.). Revision includes, in addition, C. craterellus, C. kobelti, C. sardiniellus, C. cornutellus, C. cassentiniellus, C. tingitanellus and C. similimellus; author employs Kiriakoff's terms 'ultraspecies' and 'semispecies' to express rank of some forms. New entities and ♂ genitalia of several spp. are figured. [P.B.]

254. McDunnough, James H., "Two unrecorded homonyms in the genus Euxoa (Lepid. Phalaenidae)." Bull. Brooklyn Ent. Soc., vol.45: p. 84. June 1950. Smith's names orbicularis and incallida.

255. McDunnough, James H., "Species of Euxoa of Eastern North America, with particular reference to genitalic characters (Lepidoptera, Phalaenidae)." Bull. Amer. Mus. Nat. Hist., vol.95: pp.359-408, 11 pls. 29 Dec. 1950. Describes as new Euxoa servita novangliae (Franconia, New Hampshire). Describes and figures ♂ and ♀ genitalia of 32 spp. and sspp. Gives a key based on ♂ genitalia. [P.B.]

256. McElvare, Rowland R., "A new heliothid from New Mexico." Bull. Brooklyn Ent. Soc., vol.45: pp.83-84, 1 fig. June 1950. Describes as new Dasyspoudea zuni (Black Rock, McKinley Co.). Figures adult. [P.B.]

257. McElvare, Rowland R., "A new Grotella from southwest Texas (Lepidoptera, Phalaenidae)." Bull. Brooklyn Ent. Soc., vol.45: pp.117-118, 1 fig. Oct. 1950. Describes as new G. vauriae (Tornillo Creek, Brewster Co.). Figures adult. [P.B.]

258. Moeck, Arthur H., "A new subspecies of Speyeria atlantis (Edwards) from Nevada (Lepidoptera: Nymphalidae)." Ent. News, vol.61: pp.61-64, 4 figs. May 1950. Describes as new S. a. greyi (E. Humboldt Range). Figures both sexes. [P.B.]

259. Munroe, Eugene, "The generic positions of some North American species commonly referred to Pyrausta Schrank (Lepidoptera: Pyralidae)." Canad. Ent., vol. 82: pp.217-231, 28 figs. Nov. 1950. Describes as new: MIMOPHOBETRON (type Pyrausta liopasialis); MACROBOTYS (type Botys aeglealis). Discusses genera Blepharomastix, Palpita, Udea, Polygrammodes, Sameodes and Mecyna and gives generic keys. [P.B.]

260. Obraztsov, N., "Two new palearctic genera of the tribe Laspeyresiini (Lepidoptera, Tortricidae)." Tijdschr. Ent., vol.93: pp.99-100, 2 figs. 20 Mar. 1951. Describes as new EUCOSMORPHA (type Tortrix rheediana Hw.) and CIRRIPHORA (type Grapholitha pharaonana Koll.). [A.D.]

261. Olthof, J. T., "Some Neptis hordonia subspecies from Indonesia." Idea, vol.8: pp.97-98. 31 Jan. 1951. Describes as new N. h. dubiosa (Kangean Is.) and N. h. anna (Flores). [A.D.]

262. Orfila, Ricardo N., "Orneodes riggii sp. nov." [In Spanish]. Commun. Inst. Nac. Invest. Cienc. Nat., Cienc. Zool., vol.1, no.10: 8 pp., 1 pl, 2 figs. 1949. Type locality La Rioja, Argentina. Figures adult and ♂ genitalia. Brief account of family Orneodidae. [P.B.]

263. Pastrana, José A., "Una nueva peste en Araucarias de Misiones (Republica Argentina) (Lepidoptera - Grapholitidae)" [In Spanish]. Rev. Invest. Agric. Argentina, vol.4: pp.243-244, 2 pl. 1950. Describes as new Laspeyresia araucariae (San Antonio, Misiones, Argentina). Figures adult, ♂ and ♀ genitalia, and other structural details. Larva, not described, on Araucaria angustifolia. [P.B.]

264. Picard, J., "Note sur les Hesperiidae français" [In French]. Rev. Franç. Lépid., vol.12: pp.23-31. "Jan." [28 Feb.] 1949. Notes on generic concept, on the application of the names fritillarius and fritillum (synonyms of Pyrgus malvae), and on Pyrgus armoricanus corsicus and Thymelicus acteon. [P.B.]

265. Picard, J., "Pyrgus carlinae Rbr. et sa sous-espèce cirsii Rbr." [In French]. Lambillionea, vol.50: pp.53-58, 1 map. 25 June 1950. Concludes, on the basis of distribution, morphology, and the existence of intermediate populations, that cirsii and carlinae are conspecific. [P.B.]

266. Picard, J., "Petite étude sur Pyrgus bellieri Obth." [In French]. Rev. Franç. Lépid., vol.12: pp. 49-58, 2 figs., 1 map. "Feb." [2 Apr.] 1949. Taxonomic history, distinction from P. alveus, distribution, geographical and individual variation. [P.B.]

267. Remington, C. L., "Principles of taxonomy." Lep. News, vol.2: pp.26, 38, 50, 62, 102. "Mar." [June], "Apr." [June], "May" [July], "June" [Aug.], "Nov." [Dec.] 1948.

268. Remington, C. L., "Procedure in taxonomy." Lep. News, vol.2: pp.26, 38, 50, 78, 102; vol.3: p.14. "Mar." [June], "Apr." [June], "May" [July], "Oct." [Nov.], "Nov." [Dec.] 1948; "Feb." [Apr.] 1949.

269. Smelhaus, Jiří, "Polyommatus hybr. cormion Nabokov (Pol. meleager Esp. x Pol. coridon Poda). (Lep. Lyc.)" [In Czech, French summary]. Acta Soc. Ent. Čechosloveniae, vol.45: pp.50-55, 10 figs. 1 May 1948. Concludes, on the basis of ♂ genitalia, that this hybrid (see Lep. News, vol.4: abs. no. 135) is the same as Nabokov's 'species'. [P.B.]

270. Sperry, John L., "Geometrid notes, a new genus and species from Arizona." Bull. Brooklyn Ent. Soc., vol.44: pp.158-162. Dec. 1949. Describes as new: HERRESHOFFIA, H. gracea (Todd's Lodge, Oak Creek Canyon, Ariz.). Notes on 5 Ennominae. [P.B.]

271. Stempffer, H., "Description de quelques Lycaenidae (Lep.) nouveaux de la faune éthiopienne" [In French]. Bull. Soc. Ent. France, vol.56: pp.66-71, 4 figs. May 1951. Describes as new: Liptena rochei (Lagos, Nigeria); Hewitsonia magdalenae (Eala, Belgian Congo); Lepidochrysops desmondi (Olarisi Hill, Chepalungu Distr., Kenya); L. victoriae vansomereni (Athi R. bridge, 18 mi. from Nairobi, Kenya). Transfers Triclema quadricaudata Beth. to Neurellipes on basis of description of previously unknown ♂. Figures ♂ genitalia of last and of new spp. [P.B.]

272. de la Torre y Callejas, Salvador Luis, "Notas suplementarias a nuestro trabajo sobre el género Danaus (Lepidoptera, Rhopalocera)" [In Spanish]. Mem. Soc. Cubana Hist. Nat., vol. 10: pp.93-103. June 1951. Summarizes American spp. and sspp. of genus; notes on 8 Cuban and Central American forms. [P.B.]

273. Viette, P., "Essai d'un tableau de détermination des familles de Tinéides de la faune française" [In French]. Rev. Franç. Lépid., vol.12: pp.16-23. "Jan." [28 Feb.] 1949. Key to the 27 families of 'tineids' (i.e. the Monotrysia and lower Ditrysia) found in France. [P.B.]

274. Viette, P., "Sur les genres Cocytodes Gn. et Arcte Koll. (Lepid. Noctuidae)" [In French]. Bull. Mens. Soc. Linn. Lyon, vol.18: pp.27-29, 10 figs. Feb. 1949. Describes as new PSEUDOARCTE (type Cocytodes maura Holl.). Cocytodes a synonym of Arcte. Key to the 4 spp. of Arcte, based on ♂ genitalia. [P.B.]

275. Viette, P., "Contribution à l'étude des Micropterygidae (3me note). Rectification et description, d'une espèce et d'une forme nouvelles" [In French]. Bull. Mens. Soc. Linn. Lyon, vol.18: pp.87-89, 3 figs. May 1949. Describes as new Micropteryx lambesiella (Lambèse, Algeria); figures wing pattern, and ♂ genitalia of this sp. and M. myrtetella. [P.B.]

276. Viette, P., "Note sur la position systématique de Laelapia notata Btlr. (Lépid.)" [In French]. Bull. Mens. Soc. Linn. Lyon, vol.18: pp.170-172, 7 figs. Oct. 1949. Redescribes this arctiid, figuring venation and genitalia; genus originally placed in Lymantriidae. [P.B.]

277. Viette, Pierre E. L., "Contribution to the study of Hepialidae (9th note): the genus Phassodes Bethune-Baker (Lepidoptera)." Proc. Hawaiian Ent. Soc., vol.14: pp.189-190, 4 figs. Mar. 1950. Redescribes genus; figures ♂ genitalia. P. nausori a synonym of P. vitiensis. [P.B.]

278. Viette, P., "Contribution à l'étude des Hepialides (16e note). Sur quelques espèces de la collection Pfitzner" [In French]. Bull. Soc. Ent. France, vol. 55: pp.116-119, 6 figs. Oct. 1950. Describes as new: PFITZNERIELIA (type Triodia remota); PSEUDOPHILAENIA (type Philaenia omagua). Describes ♂ genitalia of Philaenia fasslii and P. sanguanmachica. [P.B.]

279. Walkden, H. H., "Cutworms, armyworms and related species attacking cereal and forage crops in the central Great Plains." U. S. Dept. Agric. Circ. no.849: 52 pp., 7 figs. Oct. 1950. Account of distribution, biology and economic importance of 53 spp. of Noctuidae, with a key to the larvae of 31. Good figures illustrate the key characters. [P.B.]

280. Wehrli, Eugen, "Die Einteilung der Gattung Dyscia Hbn." [In German]. Ent. Berichten, vol.13: pp.77-79, 6 figs. 1 May 1950. Describes as new the subgenera EUDYSCIA (type D. fagaria); WARNECKEELIA (D. malatyana); IBERAFRINA (D. penulataria); CALODYSCIA (D. sicanaria); CATADYSCIA (C. atlantica); RJABOVANA, and type D. (R.) negrama. Figures ♂ genitalia of all except D. atlantica, and of D. conspersaria, the generotype. No locality is given for D. negrama, and the species is not completely described. [P.B.]

281. Wiltshire, E. P., "A year on a Tigris island." Journ. Bombay Nat. Hist. Soc., vol.49: pp.637-660, 3 pls., 2 figs., 1 map. Apr. 1951. Describes as new Celama harouni (Karradah Is., Tigris R., Iraq); figures ♂ genitalia, compared with those of C. centonalis. Lists 50 permanent or temporary resident spp. of the island, and a number of casual visitors; discusses the biology and ecology of the former and of the island fauna as a whole. Island is periodically submerged, except for the treetops, by floods. [P.B.]

282. Wykes, N. G., "The African Charaxes." Proc. Trans. South Lond. Ent. Nat. Hist. Soc., 1948-49: pp.165-168. Feb. 1950. General account of the genus, with notes on a number of African spp. [P.B.]

283. Zikan, J. F., "Observações sobre os componentes dos gêneros Phaenochitonia Stichel e Pterographium Stichel, com a descrição de uma nova espécie e criando um novo gênero (Riodinidae, Lepidoptera)" [In Portuguese]. Revista Ent., vol.20: pp.535-539, 3 figs. [31 Aug.] 1949. Describes as new STICHELIA (type Phaenochitonia bocchoris Hewitson); Pterographium similatum (São Gabriel, Rio Negro, Amazonas, Brazil). Figures both sexes and venation of new sp. Comments on 10 other spp.; 5 are transferred from Phaenochitonia to Stichelia. [P.B.]

284. Zimmerman, Elwood C., "A new Protaulacistis from Kauai (Lepidoptera: Pyraustinae)." Proc. Hawaiian Ent. Soc., vol.14: pp.337-340, 7 figs. Mar. 1951. Describes as new P. swezeyi (Kokee, Kauai, Hawaiian Is.); figures adult and ♂ and ♀ genitalia. [P.B.]

285. Zimmerman, Elwood C., and J. D. Bradley, "A new genus and species of Elachistidae mining Lonicera leaves in Hawaii (Lepidoptera)." Proc. Hawaiian Ent. Soc., vol.14: pp.191-196, 5 figs. Mar. 1950. Describes as new SWEZEYULA lonicerae (Honolulu, Hawaii); figures adult, ♂ and ♀ genitalia and other structures. [P.B.]

N O T I C E S

Lepidopterists' Society members may use this page free of charge to advertise their offerings and needs in Lepidoptera. The Editors reserve the right to rewrite notices for clarity or reject unsuitable notices. Unless withdrawn sooner by the member, each notice will appear in three numbers. We can not guarantee any notices but expect all to be bona fide. Please notify us of any abuse of this service.

BRAZILIAN BUTTERFLIES and other insects for sale, 1951 catch, papered with full data, mostly classified. Please write to Jorge Kesselring, Caixa Postal 6, João Pessoa (Paraiba), BRAZIL.

Will buy or exchange for the following: Phobetron pithecium A.and S.(The Monkey Slug) ♂ and ♀; Callosamia promethea ♂ and ♀; Thysania (Erebus) zenobia ♂ and ♀. L.N. Kilman, 2314 59th St. So., St. Petersburg 7, Fla.

Wanted: Argynnis, Speyeria, Brenthis, Boloria, etc., Erebia and other satyrids from all parts of the world. Will collect in all orders of insects, esp. from Denmark, in exchange for these. Georg Christensen, Parmagade 24 III, Copenhagen S, DENMARK.

Catocala herodias Stkr., Automeris pamina Neum., and A. pamina f. aurosea Neum. in series, many other rare moths, offered in exchange for the following nos. from the McD. list: 31d; 35b; 46a; 52b,d,e,g; 79a; 206d,e; 207a,b; 215; 241; 243; 245; 254; 270c; 337b; 423c; 430a; 455h; 456a; 467c; 469. Also want any nearctic Oeneis or Erebia including common species in series. Send list of desiderata to Paul R. Ehrlich, 538 Academy St., Maplewood, N.J.

---

12 topotypes of POLITES MARDON offered in exchange for nearctic Catocala and Sphingidae new to my collection. Also Parnassius clodius claudianus topotypes offered in series of six pair for similar series of Parnassius and Papilio of the world. Don Frechin, Route 5, Box 838, Bremerton, Wash.

Exchange desired to complete my collection of Nearctic and European Lepidoptera. Desire material as follows: all Rhopalocera; all Macroheterocera; and Hepialidae, Yponomeutidae, Pterophoridae, Orneodidae, Pyralidae, Aegeriidae, Cossidae, Zygaenidae, Cochlidiidae, Nolidae, Lacosomidae, Psychidae. Offer in exchange Lepid. of Ohio and elsewhere. Edward C. Welling, 700 E. 240 St., Euclid 23, Ohio.

Palaearctic Euphydryas wanted - long series for research. Wish to exchange Nearctic butterflies or will pay Lepid. Society dues for foreign collectors who can procure long series of needed species for me. Esp.desire Central Asiatic specimens. Nicholas W. Gillham, 4 Washington Square North, New York City, N.Y.

Exchange for South American or southwestern U.S.A. Sphingidae: Seitz "American Moths", English edition, pp.5-416, pls.1-51, Castniidae, Zygaenidae, Syntomidae complete; Arctiidae incomplete; pp.675-711 Bombycidae complete text with pls.140-141. F.E. Holley, 126 Ash St., Lombard, Ill.

MEXICAN butterflies, papered, with full data, offered in exchange for Theclinae of the world. Inquiry invited. E.W. Fager, Institute of Radiobiology and Biophysics, University of Chicago, Chicago 37, Ill.

Lepidoptera from PERU for scientific purposes collected on order by professional field entomologist for many years serving research entomologists. Felix Woytkowski, Francisco Zela 1067, Letra "L", Lima, PERU.

For sale: Vol.IX, plates only, of Seitz' "Macrolepidoptera of the World." Excellent condition. Otto H. Schroeter, P.O. Box 391, Quaker Hill, Conn.

Wish to contact those desiring Lepid. for art work. Taking '52 orders. M. Eugene Smith, Newnan, Georgia.

Rarities from Spain and rare endemic spp. from Atlas Mts. of Morocco. Will sell, or exchange for better Palearctic and Nearctic Rhop., esp. Alpine and Arctic spp. C.W. Wyatt, Cobbetts, Farnham, Surrey, ENGLAND.

Wanted: North Am. noctuids not in my collection. Also will buy 10,000 butterflies and beetles per month, under 1.5", for art work. Give price per 1000; send samples. C.Hill, 1350 San Luis Rey Dr.,Glendale 8,Calif.

California moths and butterflies for sale, papered, pinned, to suit. Many pupae available. Inquiry invited. F.P. Sala, 1912 Hilton Drive, Burbank, Calif.

LIVING MATERIAL

Wanted: fertile ova, larvae, and less common moths of the genus Catocala; also Aegeriidae. Offer in exchange many spp. of Lepidoptera or other insects. Or will try to secure your needs in this part of the country. A.E. Brower, 5 Hospital St., Augusta, Maine.

Chrysalids of EUPHYDRYAS EDITHA TAYLORI available in March and April at $1.00 per 20. Orders over $2.00 postpaid. Order now, send money after delivery. Don Frechin, Route 5, Box 838, Bremerton, Wash.

Expect to have available at their season, eggs of P. cecropia, C. promethea, A. luna, A. io and C. regalis. Would like to trade for adult Lepidoptera. List of desiderata and terms of trading upon request. Otto Ackermann, 639 Walnut St., Irwin, Pa.

Living pupae, cocoons, and chrysalids from Europe and cocoons of Actias selene (India) for sale or exchange for native pupae, especially Sphingidae and Saturniidae. Native and exotic ova in season. Duke Downey, 51 West 4th St., Sheridan, Wyoming.

Wild (Conn.) cocoons of SAMIA CYNTHIA, in refrigeration, offered in exchange for living pupae of other Lepidoptera. Esp. need cocoons of Actias luna, for each of which ten S. cynthia cocoons will be sent. C.L. Remington, Osborn Zool. Lab., Yale University, New Haven 11, Conn.

Living pupae of European Lepidoptera offered in exchange for pupae of Papilionidae, Saturniidae, Sphingidae from North America. Adolf Witz, Groner Strasse 19o, Göttingen, GERMANY.

Eggs and living chrysalids of THEOPHILA MANDARINA required. In order to make arrangements, please write first. J.M. Legay, Assistant in Zoology, Station de Recherches Séricicoles, Ales (Gard), FRANCE.

Q. "Can you tell me how Phyciodes batesii may be distinguished from ♀ tharos and if Holland's figure of tharos ♀ is correct? I have tried to solve the problem by getting all the pairs I can of either tharos or batesii copulating. I now have three pairs of tharos and two pairs of batesii found copulating. I can distinguish between the pairs when found copulating as the tharos ♂ is quite distinctive. Holland in his book shows figures of ♂ and ♀ tharos and his ♀ looks just like the ♂ and in the three pairs I have this is not so. All my females look like what he figures as batesii. The two copulating pairs which I have concluded are batesii all look alike and are similar to Holland's figure of batesii. I cannot help concluding that Holland's figure of a ♀ tharos is incorrect."

A. Holland's figures are of the correct species, but his figs.3 and 4, supposed to be marcia, are more like typical tharos. Batesii female is distinguished by the less brown shading about the silver crescent on the border of the hind wing (none in the male), the much heavier black spotting of under side of fore wing, and almost always by the presence of a median band of much paler (usually straw yellow) spots on upper side and under side of fore wing. Also they have a different flight time, in New York at least: fresh male batesii flying with late battered specimens of the first brood of tharos, while rubbed female batesii fly with early specimens of the second brood of tharos. In the far north, where tharos is single-brooded, batesii is believed not to occur.

Q. "What evolutionary relationship can one attach to the presence of two female genital openings in the Hepialidae and most other Lepidoptera, but one opening in the Micropterygidae, Eriocraniidae, and a few "Micros"? Some recent papers give the single opening a very large significance, but I am puzzled by the hepialid condition."

A. This feature serves mainly to indicate how much we do not yet know on the morphology and relationships of the insects. The double female reproductive outlet is of a distinctive type in the higher Lepidoptera (Ditrysia) unlike that of the Hepialidae, which may well have arisen independently, as it has in some other insects. There is also the possibility of reduction in the families with a single outlet, since they are all minute forms, - with reduced male external structures. Intermediate forms need further study, notably the Tischeriidae, Opostega, Eudarcia, and many exotics.

W.T.M.F.

The third part of the Prof. W.T.M. Forbes' The Lepidoptera of New York and Neighboring States will deal with the huge family Noctuidae. The manuscript has now been completed. Prof. Forbes writes: "I have no idea how long it will take in press, almost certainly a year, and Part I was four years!"

In Connecticut, during the interim, we are finding the two most useful reference works on our noctuids to be Forbes' "A Table of the Genera of Noctuidae of Northeastern North America" (Journ. N.Y. Ent. Soc., vol.22: pp.1-33; 1914) and "The Noctuidae of Pennsylvania. A Manual", by H.M. Tietz, (Penn. State Coll. Sch. Agr. and Exper. Sta., Bull.335: 164 pp.; 1936). The latter gives references to figures and descriptions and to all life-history notes.

C.L.R.

Blevins, T.B., R.F.D. 3, Box 452M, Vienna, Virginia.
Crickmer, Noël, Borrego Valley, Borrego Springs, Calif.
Frechin, D.P., Route 5, Box 838, Bremerton, Wash.
Loh, P.C., c/o Messrs. Fehaco Ltd., 401/405 Marina House, HONG KONG.
Orchard, C.D., Grayson St. Station, P.O. Box 242, San Antonio, Texas.
Panske, L.G., 2215 W. Eire St., Chicago, Ill.
Reichel, J., Baumholder/Pfalz, Amerik. Personalbüro, GERMANY.
Richard, R.E., 1811 N. Highview, Dearborn, Mich.
Sala, F.P., 1912 Hilton Drive, Burbank, Calif.
Schoenherr, W.H., 225 Cedar Ave., Danville, Ill.
Stein, G.L.,302A W. Belleview Ave.,Porterville, Calif.
Wagner, Richard, 97 Franklin Rd., Teaneck, New Jersey.
Was, H.E., 4118 W. Fairmont Ave., Milwaukee 9, Wis.
Whittaker, R.H., Aquatic Biol. Unit, Radiological Science Dept., General Electric Co., Richland, Wash.

ADDITIONS TO THE LIST OF MEMBERS

Baker, Nelson W., 279 Sherwood Drive, Santa Barbara, Calif.
Blackman, Thomas M., Idyllwild, Calif.
Brinckerhoff, Mr. and Mrs. R.F., Abbott Hall, Phillips Exeter Academy, Exeter, New Hampshire.
Brooks, Paul, Silver Hill Road, Lincoln, Mass.
Butler, Robert, Box 326, Southern Pines, North Carolina.
Dalkoff, Leonard, 1726 29½ St., Rock Island, Ill.
Harrington, Peter F., 88 Heddington Ave., Toronto, Ont., CANADA.
Hilliard, Stephen S., 25 Beech St., Framingham, Mass.
Jacoulet, Paul, Karuizawa, 1371, Nagano Ken, Shinsu, JAPAN.
Kaisila, Jouko, Zoological Institute of University, P. Rautatiek. 13, Helsinki, FINLAND.
Latham, Roy, Orient, Long Island, New York.
Minahan, Roger P., 8372 E. Westminster Ave., Westminster, Calif.
Norwood, Frederick A. (Dr.), 24 Monroe St., Berea,Ohio.
Salmon, John D.(Dr.), Entomologist, Dominion Museum, Wellington, NEW ZEALAND.
Sette, Oscar E., 4490 Aukai Ave., Honolulu, Hawaii.
Suomalainen, Esko (Prof.Dr.), Institute of Genetics, The University, P. Rautatiekatu 13, Helsinki,FINLAND.
Wetherbee, Wallace P., 25 Foster St., Worcester, Mass.

DECEASED

Bridwell, L.H. (Texas).
Federley, Harry (Finland).
Forsyth, Marguerite (Mrs.) (Florida).
Williams, Evelyn G. (Mrs.) (California).

RESEARCH REQUESTS

For my revisionary study of the genus Cymothoë, I need little series (♂-♀) of all East and South African species. I purchase, exchange, or borrow. Specimens received for study generally had been misdetermined. Acknowledgments on publication. Please write: F.G. Overlaet, 9 Chaussée de Louvain, Kortenberg, Brabant, BELGIUM.

I have begun a revisionary study of the world Euphydryas. Distribution and flight-period data, and particularly life history notes and accurate data on any hybridization experiments will be greatly appreciated. Pupal material of either Palaearctic or Nearctic species much desired. I am also interested in borrowing series of Euphydryas. Help will be acknowledged upon publication. Please write: Nicholas W. Gillham, 4 Washington Square North, New York, N.Y.

INDEX TO SUBJECTS IN VOLUME 5

INDEX TO SUBJECTS - cont.

MAILING DATES, THE LEPIDOPTERISTS' NEWS

Volume 4, numbers 8-9: 9 May 1951.

Volume 5, numbers 1-2: 6 June 1951.

Volume 5, numbers 3-5: 4 Oct. 1951.

Volume 5, numbers 6-7: 9 Nov. 1951.

INDEX TO AUTHORS

E R R A T A

Vol.4: p.92, left column, 3rd line from bottom: "EASTERN AREA" should be "WESTERN AREA".

Vol.5: p.5, right column, paragraph 4, next to last line: "accent" should be "accept".

Vol.5: p.29, left column, paragraph 2, line 8: after "(Hbn.)" insert: "and C. whitimerellus Klots or Udea ferrugalis (Hbn.)"

Vol.5: p.29, right column, last paragraph, line 2: after "microlepidoptera" insert: " : Eucosma".

Vol.5: p.67, right column, top, delete lines 4-5: "The wing-radii .....bred ♂♂."

Vol.5: p.80, add "(Brasil)" for D'ALMEIDA.

THE LEPIDOPTERISTS' SOCIETY

OFFICERS FOR 1951

President:	J. H. McDUNNOUGH (Halifax, Canada)
Senior Vice President:	AUSTIN H. CLARK (Washington, U.S.A.)
Vice President:	WALTER FORSTER (München, Germany)
Vice President:	KENNETH J. HAYWARD (Tucumán, Argentina)
Secretary:	FREDERICK H. RINDGE (New York, U.S.A.)
Treasurer:	J. B. ZIEGLER (Summit, N.J., U.S.A.)

EXECUTIVE COUNCIL

Ex-officio: the Six Officers and the Editor-in-Chief

Term expires Dec. 1951:	THOMAS N. FREEMAN (Ottawa, Canada) HENRI STEMPFFER (Paris, France)
Term expires Dec. 1952:	LLOYD M. MARTIN (Los Angeles, U.S.A.) N. D. RILEY (London, United Kingdom)
Term expires Dec. 1953:	J. G. FRANCLEMONT (Washington, U.S.A.) TAKASHI SHIRÔZU (Fukuoka, Japan)

The object of the Lepidopterists' Society, which was formed in May, 1947, and formally constituted in December, 1950, is "to promote the science of lepidopterology in all its branches, ... to issue a periodical and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to secure cooperation in all measures" directed toward these aims (Constitution, Art.II). A special goal is to secure free interchange among the lepidopterists of all countries.

Membership in the Society is open to all persons interested in any aspect of lepidopterology. Prospective members must be nominated by two members in good standing and then become members by paying the current annual dues. Memberships are for full calendar years only. All members in good standing receive The Lepidopterists' News. Institutions may subscribe to the publications but may not become members. Applications for membership should be sent to the Secretary, and all correspondence concerning membership and general Society business should be directed to him. Completed membership forms and remittances should be sent directly to the Treasurer. All remittances should be made payable to: The Lepidopterists' Society. There are three paying classes of membership:

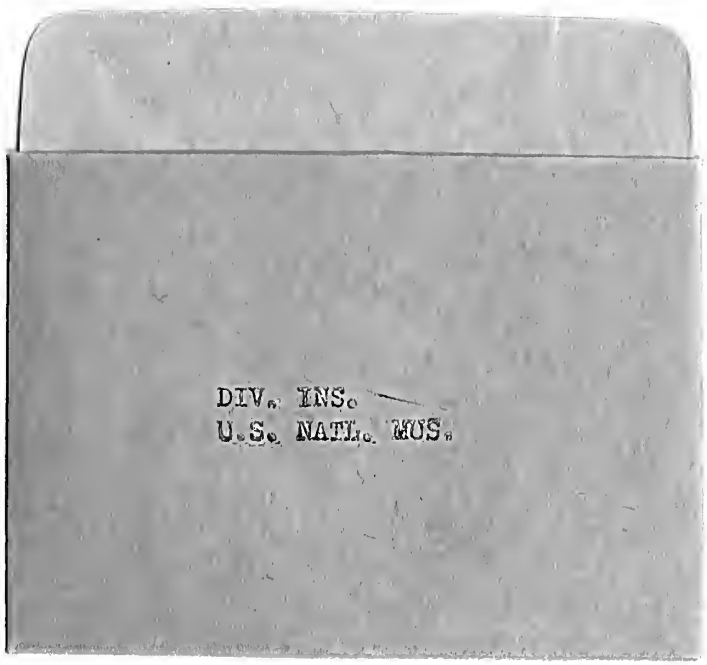
Active Members - annual dues $2.00 (U.S.A.)
Sustaining Members - annual dues $5.00 (U.S.A.)
Life Members - single sum $50.00 (U.S.A.)

The minimum fee for Active Members is not sufficient to finance the News and other Society activities. Nevertheless, this fee is kept low so that cost of membership will not be burdensome to any member, regardless of monetary difficulties in his country or private economic reasons. Obviously, the Sustaining Members make up the difference. A large proportion of the Society members have always maintained themselves generously in the Sustaining category. Members not yet Sustaining are earnestly urged to consider elevating their class of membership.

Each year a list of all members of the Society is published, with addresses and special interests.

An Annual Meeting is held each year at which election of officers and presentation of papers and exhibits take place. All members of the Society are expected to vote for officers when mail ballots are distributed by the Secretary. Special Meetings may be called by the Secretary on receipt of a written request from the President or signed by ten members.

TABLE OF CONTENTS — SOMMAIRE — INHALT


DIV. INS.
U.S. NAT. MUS.